Ranchi Women's College, Ranchi

(An Autonomous Unit of Ranchi University from 2012)

COURSES OF STUDY

For

Bachelor of Science in Information Technology (Honours)

Choice Based Credit System

2021-2024

Under

Department of Information Technology

Number of Semester: 6

(Papers- CC:14 SEC:4 GE:8 DSE:4 AECC:2)

Minutes of Meeting

A meeting of **Board of Studies** was held in Department on 07-04-2021 at 03:00 pm onwards to review the syllabus of B.Sc. (Information Technology) Hons.

The members present were:-

University Nominee:-

S. No.	Name	Designation	Signature
1.	Dr. A.K. Jha	Associate Professor, Department of Mathematics, Ranchi University, Ranchi	07/04/21

Subject Experts:-

2.	Dr. Birendra Goswami	Assistant Professor, Dept. of Computer Science, ICFAI, Ranchi.	7.4.21.
3.	Dr. Vinay Singh	Assistant Professor, Department of Computer Science, Usha Martin University, Ranchi	07/4/21

Coordinator:-

4.	Dr. Asha Lata Keshri (Information Technology)	Coordinator, Information Technology, Ranchi Women's College, Ranchi	07.04.21

Faculties:-

5.	Ms. Dolly Kumari (Information Technology)	Lecturer, Dept. of Information Technology, Ranchi Women's College, Ranchi	7/4/21
6.	Ms. Purnima Kumari Srivastava (Information Technology)	Lecturer, Dept. of Information Technology, Ranchi Women's College, Ranchi	7/4/2021
7.	Ms. Mamata Pandey (Information Technology)	Lecturer, Dept. of Information Technology, Ranchi Women's College, Ranchi	Mamata
8.	Dr. Meeta Bhatia (Computer Application)	Lecturer, Dept. of Computer Application, Ranchi Women's College, Ranchi	Meeta Bhatia 7/4/2021.
9.	Ms. Urmila Bhagat (Computer Application)	Lecturer, Dept. of Computer Application, Ranchi Women's College, Ranchi	Urmila Bhagat 7/4/21

Representative from Industry/ Allied Field:-

10.	Mr. Niranjan Khushwaha	Network and Security, Administrative	7/4/21

Agenda : Discussion and approval of the syllabus (Developed by RU) based on CBCS guidelines.

Resolution : CBCS Syllabus was approved with minor changes.

Member Secretary
Academic Council
Ranchi Women's College

CHAIRPERSON
ACADEMIC COUNCIL
RANCHI WOMEN'S COLLEGE

Department of Information Technology
SCHEME FOR CHOICE BASED CREDIT SYSTEM IN
(Syllabus for 3 yr Degree Course: Information Technology (H))

A meeting of board of Studies was held in the Department of Information Technology, Ranchi Women's College, Ranchi on 07-04-2021 at onwards to review the syllabus of Information Technology Hons. The Resolution Passed in the meeting was regarding modification and review of syllabus in Sem-I to Sem-VI.

The details in the modification in the syllabus of Sem-I to Sem-VI are as follows:

Semester	Old (2020)			New (2021)			Remarks
	Paper Code	Course Name	Credits	Paper Code	Course Name	Credits	
I	AECC	Alternate English / MIL Hindi	2	AECC	Alternate English / MIL Hindi	2	No change
	CC - I	Programming Fundamentals using C/C++	4	CC - I	Programming Fundamentals using C/C++	4	No change
	CC - I Practical	Programming Fundamentals using C/C++ Lab	2	CC - I Practical	Programming Fundamentals using C/C++ Lab	2	No change
	CC - II	Computer System Architecture	4	CC - II	Computer System Architecture	4	No change
	CC – II Practical	Computer System Architecture Lab	2	CC – II Practical	Computer System Architecture Lab	2	No change
	GE - I	GE-1(MATHS)	4/5	GE - I	GE-1(MATHS)	4/5	No change
	GE - II	GE-2(PHYSICS)	4/5	GE - II	GE-2(PHYSICS)	4/5	No change
II	AECC	Environmental Science	2	AECC	Environmental Science	2	No change
	CC – III	Programming in JAVA	4	CC – III	Programming in JAVA	4	No change
	CC – III Practical	Programming in JAVA Lab	2	CC – III Practical	Programming in JAVA Lab	2	No change
	CC – IV	Discrete Structures	5	CC – IV	Discrete Structures	5	No change
	CC – IV Tutorial	Discrete Structures Tutorial	1	CC – IV Tutorial	Discrete Structures Tutorial	1	No change
	GE – III	GE-3 (MATHS)	4/5	GE – III	GE-3 (MATHS)	4/5	No change
	GE – IV	GE-4(PHYSICS)	4/5	GE – IV	GE-4(PHYSICS)	4/5	No change
III	CC – V	Data Structures with C	4	CC – V	Data Structures with C	4	No change
	CC – V Practical	Data Structures with C Lab	2	CC – V Practical	Data Structures with C Lab	2	No change
	CC – VI	Operating Systems	4	CC – VI	Operating Systems	4	No change
	CC – VI Practical	Operating Systems Lab	2	CC – VI Practical	Operating Systems Lab	2	No change
	CC – VII	Computer Networks	4	CC – VII	Computer Networks	4	No change
	CC – VII Practical	Computer Networks Lab	2	CC – VII Practical	Computer Networks Lab	2	No change
	SEC - I	SEC-1 (Android Programming)	2	SEC - I	SEC-1 (Android Programming)	2	No change
	GE – V	GE-5 (MATHS)	4/5	GE – V	GE-5 (MATHS)	4/5	No change
	GE – VI	GE-6(PHYSICS)	4/5	GE – VI	GE-6(PHYSICS)	4/5	No change
IV	CC – VIII	VB.Net	4	CC – VIII	VB.Net	4	No change

	CC – VIII Practical	.Net Lab	2	CC – VIII Practical	.Net Lab	2	No change
	CC – IX	Software Engineering	4	CC – IX	Software Engineering	4	No change
	CC – IX Practical	Software Engineering Lab	2	CC – IX Practical	Software Engineering Lab	2	No change
	CC – X	Database Management Systems	4	CC – X	Database Management Systems	4	No change
	CC – X Practical	Database Management Systems Lab	2	CC – X Practical	Database Management Systems Lab	2	No change
	SEC - II	SEC-2(MATLAB Programming)	2	SEC - II	SEC-2(MATLAB Programming)	2	No change
	GE - VII	GE-7 (MATHS)	4/5	GE - VII	GE-7 (MATHS)	4/5	No change
	GE - VII	GE-8 (PHYSICS)	4/5	GE - VII	GE-8 (PHYSICS)	4/5	No change
V	CC – XI	Internet Technologies	4	CC – XI	Internet Technologies	4	No change
	CC – XI Practical	Internet Technologies Lab	2	CC – XI Practical	Internet Technologies Lab	2	No change
	CC – XII	Theory of Computation	5	CC – XII	Theory of Computation	5	No change
	CC – XII Tutorial	Theory of Computation Tutorial	1	CC – XII Tutorial	Theory of Computation Tutorial	1	No change
	DSE – I	DSE-1 (Information Security & Cyber Law)	4	DSE – I	DSE-1 (Information Security & Cyber Law)	4	No change
	DSE – I Practical	DSE-1 Lab	2	DSE – I Practical	DSE-1 Lab	2	No change
	DSE – II	DSE-2 (Programming in Python)	4	DSE – II	DSE-2 (Programming in Python)	4	**removed unit1 & unit 2 and add some topics like Function, Classes and objects , File Handling**
	DSE – II Practical	DSE-2 Lab	2	DSE – II Practical	DSE-2 Lab	2	No change
VI	CC – XIII	Artificial Intelligence	4	CC – XIII	Artificial Intelligence	4	No change
	CC – XIII Practical	Artificial Intelligence lab	2	CC – XIII Practical	Artificial Intelligence lab	2	No change
	CC – XIV	Computer Graphics	4	CC – XIV	Computer Graphics	4	No change
	CC – XIV Practical	Computer Graphics Lab with C	2	CC – XIV Practical	Computer Graphics Lab with C	2	No change
	DSE - III	DSE-3 (Data Mining, Warehousing & Big Data)	4	DSE - III	DSE-3 (Data Mining, Warehousing & Big Data)	4	No change
	DSE – III Practical	DSE-3 Lab	2	DSE – III Practical	DSE-3 Lab	2	No change
	DSE – IV	DSE-4 Final Year Project	4	DSE – IV	DSE-4 Final Year Project	4	No change
	DSE – IV Practical	DSE-4 Practical Job Training	2	DSE – IV Practical	DSE-4 Practical Job Training	2	No change
Total							140

Program Specifics Outcomes

- To excel in software development skills coveted in the IT industry.
- To be well prepared for pursuing higher studies in related fields of teaching and research.
- develop programming skills, networking skills, learn applications, packages, programming languages and modern techniques of IT
- get skill and info not only about computer and information technology but also in common, organization and management
- Learn programming language such as C,Java, C++, HTML,CSS, JavaScript, PHP, .NET, Android, Python, SQL, etc...
- Information about various computer applications and latest development in IT and communication system is also provided
- Gives overview of the topics in IT like networking, computer graphics, web development, trouble shooting, and hardware and software skills.
- A few of them being like software programmer, system and network administrator, web designer faculty for computer science and computer applications

Course Outcomes

Semester	Paper Code & Paper Name	Course Outcomes (After the completion of this course, students will be able to:)
Sem I	CC I - Programming Fundamentals using C/C++	• Understand the basic terminology used in computer programming • Be able to explain the difference between object-oriented programming and procedural programming • Design programs involving decision structures, loops and functions. • Understand the dynamics of memory by the use of pointers. • Be able to program using C++ features such as Class, objects, operator overloads, dynamic memory allocation, inheritance and polymorphism, file I/O, exception handling, etc.
	CC II - Computer System Architecture	• Understand the major components of a computer including CPU, memory, I/O and storage. • Students will understand the uses for cache memory. • Learn about Primary and Secondary storage System. • Learn about parallel computer structure and Pipelining. • Understand the design of sequential Circuits such as Flip-Flops, Registers, and Counters. • Focusing on Assembly Language
Sem II	CC III - Programming in JAVA	• To understand fundamentals of object-oriented programming in Java, including defining classes, methods, using class libraries, exception handling etc. • Demonstrate simple data structures like arrays in a Java program • Understand the concept of package, interface, multithreading and File handling in java.
	CC IV - Discrete Structures	• Learn a number of techniques to model and solve problems in mathematical ways • Be able to reason at multiple levels of detail and abstraction, in particular, of the applicability and limitations of tools from mathematics and theoretical computer science
Sem III	CC V – Data Structures with C	• To access how the choices of data structure & algorithm methods impact the performance of program. • To Solve problems based upon different data structure & also write programs. • Design and analyze the time and space efficiency of the data structure • Apply graph and tree traverse technique to various applications. • Implement dijkstra's algorithm, binary trees
	CC VI – Operating Systems	• Learn different types of operating systems along with concept of file systems and CPU scheduling algorithms used in operating system. • Provide students' knowledge of memory management and deadlock handling algorithms. • Implement various algorithms required for management, scheduling, allocation and communication used in Operating System
	CC VII - Computer Networks	• Explain how communication works in computer networks and to understand the basic terminology of computer networks • Understand design issues in network security and to understand security threats, security services and mechanisms to counter. • Familiar with basic devices like repeaters, bridges, gateways and quality of service • Understand the network security, common threats, firewalls, and cryptography
	SEC I - Android Programming	• To understand the Android Operating System • To develop applications using Google's Android open-source platform

SEM IV	CC VIII - VB.Net	• Design, create, build, and debug Visual Basic applications. • Explore Visual Basic's Integrated Development Environment(IDE). • Implement syntax rules in Visual Basic programs. • Explain variables and data types used in program development. • Write and apply operator, decision structures, loop structures to perform tasks. • Write and apply procedures, sub-procedures, and functions to create manageable code.
	CC IX - Software Engineering	• Select and implement different software development process models. • Extract and analyze software requirements specifications for different projects. • Develop some basic level of software architecture/design. • Define the basic concepts and importance of Software project management concepts like cost estimation, scheduling and reviewing the progress.
	CC X - Database Management Systems	• Construct an Entity-Relationship (E-R) model from specifications and to transform to relational model. • Construct unary/binary/set/aggregate queries in relational algebra. • Understand and apply database normalization principles. • Understand principles of database transaction management, database recovery, security. • Analyze Data Base design methodology. • knowledge of SQL Commands
	SEC II – MATLAB Programming	• To learned features of MATLAB as a programming tool. • To learned graphic features of MATLAB and able to use this feature effectively in the various application.
SEM V	CC XI - Internet Technologies	• Familiar with Internet • Understand new threats and new opportunities in IT • To understand Green Computing and its scope.
	CC XII - Theory of Computation	• Relate formal languages and mathematical models of computation • Attain knowledge about different types of languages and the corresponding machines • Learn about the pushdown machine, Turing Machine and its role in compiler construction • Analyse classes of P, NP, NP-C and NP-Hard problems
	DSE I – Information Security & Cyber Law	• Acquire knowledge about various Information Systems. • Understand the key security requirements of Confidentiality, Integrity & Availability • Apply Symmetric Encryption techniques. • Describe the concept of Security policies and Cyber Laws.
	DSE II - Programming in Python	• To introduce various concepts of programming to the students using Python. • Students should be able to apply the problem-solving skills using Python
SEM VI	CC XIII - Artificial Intelligence	• Knowledge of the building blocks of AI • Analyze and formalize the problem as a state space, graph, design heuristics and select amongst different search or game-based techniques to solve them. • Develop intelligent algorithms for constraint satisfaction problems and also design intelligent systems for Game Playing
	CC XIV - Computer Graphics	• Introduction about Computer Graphics • Understand 2d transformations. • Familiar with techniques of clipping, three-dimensional graphics and three-dimensional transformations. • Familiar with animations

	DSE III - Data Mining, Warehousing & Big Data	• Understand the basic about data mining, classification and major issues • Learn about Data Warehouse and OLAP technology • Learn about cluster Analysis and major clustering methods • Learn how to extract useful information from big database
	DSE IV – Project	• It makes the student confident in designing an Online Project • Students are trained to meet the requirements of the Industry.

Ranchi Women's College, Ranchi
Dept. of Information Technology
(Syllabus for 3 yr Degree Course: B.Sc. Information Technology (H))

SCHEME FOR CHOICE BASED CREDIT SYSTEM IN
B.Sc. Information Technology (H)

Semester	Core Course	Ability Enhancement Compulsory Course (AECC)	Skill Enhancement Course (SEC)	Elective: Discipline Specific (DSE)	Elective: Generic (GE)
I	Programming Fundamental using C/C++ (4+2) Computer System Architecture (5+1)	English / Environmental Science			GE – 1 Math's GE – 2 Physics
II	Programming in JAVA (4+2) Discrete Structures (5+1)	English / Environmental Science			GE – 3 Math's GE – 4 Physics
III	Data Structures with C (4+2) Operating Systems (4+2) Computer Networks (5+1)		SEC – 1 Android Programming		GE – 5 Math's GE – 6 Physics
IV	Visual Basis .NET (4+2) Software Engineering (5+1) Database Management Systems (4+2)		SEC – 2 MATLAB Programming		GE – 7 Math's GE – 8 Physics
V	Internet Technologies (4+2) Theory of Computation (5+1)			DSE – 1 Information Security & Cyber Law DSE – 2 Programming in Python	
VI	Artificial Intelligence (5+1) Computer Graphics with C (4+2)			DSE – 3 Data Mining, Warehousing& Big Data DSE – 4 Final Year Project / Job Training	

Semester	Course Opted	Course Name	Credits
I	Ability Enhancement Compulsory Course -I	English / MIL communications / Environmental Science	2
	Core course-I	Programming Fundamentals using C/C++	4
	Core Course-I Practical/Tutorial	Programming Fundamentals using C/C++ Lab	2
	Core course-II	Computer System Architecture	4
	Core Course-II Practical/Tutorial	Computer System Architecture Lab	2
	Generic Elective-1	GE-1(MATHS)	4/5
	Generic Elective-1 Practical/Tutorial		2/1
	Generic Elective-2	GE-2(PHYSICS)	4/5
	Generic Elective-2 Practical/Tutorial		2/1
II	Ability Enhancement Compulsory Course-II	English / MIL communications / Environmental Science	2
	Core Course-III	Programming in JAVA	4
	Core Course-III Practical/Tutorial	Programming in JAVA Lab	2
	Core Course-IV	Discrete Structures	5
	Core Course-IV Practical/Tutorial	Discrete Structures Tutorial	1
	Generic Elective-3	GE-3 (MATHS)	4/5
	Generic Elective-3 Practical/Tutorial		2/1
	Generic Elective-4	GE-4(PHYSICS)	4/5
	Generic Elective-4 Practical/Tutorial		2/1
III	Core Course-V	Data Structures with C	4
	Core Course-V Practical/Tutorial	Data Structures with C Lab	2
	Core Course-VI	Operating Systems	4
	Core Course-VI Practical/Tutorial	Operating Systems Lab	2
	Core Course-VII	Computer Networks	4
	Core Course-VII Practical/Tutorial	Computer Networks Lab	2
	Skill Enhancement Course-1	SEC-1 (Android Programming)	2
	Generic Elective-5	GE-5 (MATHS)	4/5
	Generic Elective-3 Practical/Tutorial		2/1
	Generic Elective-6	GE-6(PHYSICS)	4/5
	Generic Elective-4 Practical/Tutorial		2/1
IV	Core Course-VIII	VB.Net	4
	Core Course-VIII Practical/Tutorial	.Net Lab	2
	Core Course-IX	Software Engineering	4
	Core Course- IX Practical/Tutorial	Software Engineering Lab	2
	Core Course- X	Database Management Systems	4
	Core Course- X Practical/Tutorial	Database Management Systems Lab	2
	Skill Enhancement Course-2	SEC-2(MATLAB Programming)	2
	Generic Elective- 7	GE-7 (MATHS)	4/5
	Generic Elective- 7 Practical		2/1
	Generic Elective-8	GE-8(PHYSICS)	4/5
	Generic Elective-8 Practical/Tutorial		2/1
V	Core Course- XI	Internet Technologies	4
	Core Course- XI Practical/Tutorial	Internet Technologies Lab	2
	Core Course-XII	Theory of Computation	5
	Core Course- XII Practical/Tutorial	Theory of Computation Tutorial	1
	Discipline Specific Elective-1	DSE-1 (Information Security & Cyber Law)	4
	Discipline Specific Elective-1 Practical/Tutorial	DSE-1 Lab	2
	DisciplineSpecificElective-2	DSE-2 (Programming in Python)	4
	DisciplineSpecificElective-1 Practical/Tutorial	DSE-2 Lab	2
VI	Core Course-XIII	Artificial Intelligence	4
	Core Course-XIII Practical/Tutorial	Artificial Intelligence lab	2
	Core Course-XIV	Computer Graphics	4
	Core Course-XIV Practical/Tutorial	Computer Graphics Lab with C	2
	Discipline Specific Elective-3	DSE-3 (Data Mining, Warehousing & Big Data)	4
	Discipline Specific Elective-3 Practical/Tutorial	DSE-3 Lab	2
	DisciplineSpecificElective-4	DSE-4 Final Year Project	4
	DisciplineSpecificElective-4 Practical/Tutorial	DSE-4 Practical Job Training	2
Total Credits			140

Semester – I
Core Course 1: Programming Fundamentals using C/C++ **Classes: 60**

1. Introduction to C and C++
History of C and C++, Overview of Procedural Programming and Object-Orientation Programming, Using main() function, Compiling and Executing Simple Programs in C++.

2. Data Types, Variables, Constants, Operators and Basic I/O
Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Data Types, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs, Character I/O (getc, getchar, putc, putcharetc), Formatted and Console I/O (printf(), scanf(), cin, cout), Using Basic Header Files (stdio.h, iostream.h, conio.hetc).

3. Expressions, Conditional Statements and Iterative Statements
Simple Expressions in C++ (including Unary Operator Expressions, Binary Operator Expressions), Understanding Operators Precedence in Expressions, Conditional Statements (if construct, switch-case construct), Understanding syntax and utility of Iterative Statements (while, do-while, and for loops), Use of break and continue in Loops, Using Nested Statements (Conditional as well as Iterative)

4. Functions and Arrays
Utility of functions, Call by Value, Call by Reference, Functions returning value, Void functions, Inline Functions, Return data type of functions, Functions parameters, Differentiating between Declaration and Definition of Functions, Command Line Arguments/Parameters in Functions, Functions with variable number of Arguments.
Creating and Using One Dimensional Arrays (Declaring and Defining an Array, Initializing an Array, Accessing individual elements in an Array, Manipulating array elements using loops), Use Various types of arrays (integer, float and character arrays / Strings) Two-dimensional Arrays (Declaring, Defining and Initializing Two Dimensional Array, Working with Rows and Columns), Introduction to Multi-dimensional arrays

5. Derived Data Types (Structures and Unions)
Understanding utility of structures and unions, Declaring, initializing and using simple structures and unions, Manipulating individual members of structures and unions, Array of Structures, Individual data members as structures, Passing and returning structures from functions, Structure with union as members, Union with structures as members.

6. Pointers and References in C++
Understanding a Pointer Variable, Simple use of Pointers (Declaring and Dereferencing Pointers to simple variables), Pointers to Pointers, Pointers to structures, Problems with Pointers, Passing pointers as function arguments, Returning a pointer from a function, using arrays as pointers, Passing arrays to functions. Pointers vs. References, Declaring and initializing references, Using references as function arguments and function return values

7. Memory Allocation in C++
Differentiating between static and dynamic memory allocation, use of malloc, calloc and free functions, use of new and delete operators, storage of variables in static and dynamic memory allocation

8. File I/O, Preprocessor Directives
Opening and closing a file (use of fstream header file, ifstream, ofstream and fstream classes), Reading and writing Text Files, Using put(), get(), read() and write() functions, Random access in files, Understanding the Preprocessor Directives (#include, #define, #error, #if, #else, #elif, #endif, #ifdef, #ifndef and #undef), Macros

9. Using Classes in C++
Principles of Object-Oriented Programming, Defining & Using Classes, Class Constructors, Constructor Overloading, Function overloading in classes, Class Variables &Functions, Objects as parameters, Specifying the Protected and Private Access, Copy Constructors, Destructors

10. Overview of Function Overloading and Operator Overloading
Need of Overloading functions and operators, Overloading functions by number and type of arguments, Looking at an operator as a function call, Overloading Operators (including assignment operators, unary operators)

11. Inheritance, Polymorphism and Exception Handling
Introduction to Inheritance (Multi-Level Inheritance, Multiple Inheritance), Polymorphism (Virtual Functions, Pure Virtual Functions), Basics Exceptional Handling (using catch and throw, multiple catch statements), Catching all exceptions, Restricting exceptions, Rethrowing exceptions.

Reference Books
1. HerbtzSchildt, "C++: The Complete Reference", Fourth Edition, McGraw Hill.2003
2. BjarneStroustrup, "The C++ Programming Language", 4th Edition, Addison-Wesley , 2013.
3. BjarneStroustroup, "Programming -- Principles and Practice using C++", 2nd Edition, Addison-Wesley 2014.
4. E Balaguruswamy, "Object Oriented Programming with C++", Tata McGraw-Hill Education, 2008.
5. Paul Deitel, Harvey Deitel, "C++ How to Program", 8th Edition, Prentice Hall, 2011.
6. John R. Hubbard, "Programming with C++", Schaum's Series, 2nd Edition, 2000.
7.Andrew Koeni, Barbara, E. Moo, "Accelerated C++", Published by Addison-Wesley , 2000.
8. Scott Meyers, "Effective C++", 3rd Edition, Published by Addison-Wesley, 2005.
9. Harry, H. Chaudhary, "Head First C++ Programming: The Definitive Beginner's Guide", First Create space Inc, O-D Publishing, LLC USA.2014
10. Walter Savitch, "Problem Solving with C++", Pearson Education, 2007.
11. Stanley B. Lippman, JoseeLajoie, Barbara E. Moo, "C++ Primer", Published by Addison-Wesley, 5th Edition, 2012

Semester I
Core Course 2:Computer System Architecture Classes: 60

Modern computer system
- Von- Newman Architecture of the computer.
- Input Devices: Key Board, Light Pen, OMR etc.
- Output Devices: Impact/non-impact printers, display devices, LCD projector etc.
- Primary Memory: RAM, ROM and their types, Cache Memory.
- Secondary Memory: HDD, CTD, Pen drive, tape device etc.
- Concept and need for Memory Hierarchy
- Virtual memory, Pipelining.
- Concept of System Software, Application Software & Utility Software.
- Flynn's classification

Introduction to Number Systems
- Decimal, Binary, Octal & Hexadecimal Base Conversion.
- Representation of binary numbers in Sign magnitude & 2's complement form.
- Internal Representation of Floating Point numbers using IEEE-754 standard.
- Representation of Characters in memory using ASCII, EBCDIC & UNICODE.
- Concept of GRAY code, Gray to binary and Binary to Gray conversion.

Digital Logic
- Boolean Algebra (Axioms/Rules),
- Canonical Expression, SOP & POS.
- Logic Gates & Truth Table,
- K- Maps (2, 3, and 4-variables).

Combinational Circuits
- Half adder, Full adder.
- Serial and parallel Adder
- Multiplexer, De-multiplexer
- Decoder, encoder.

Sequential Circuits
- SR- Latch using NOR/NAND gate, RS-flip flop,
- D-flip flop, JK Flip flop, T- flip flop, Master Slave flip flop,
- Registers, Counters (Synchronous/ Asynchronous).

INTEL-8086 architecture
- 14–general purpose registers in intel 8086 machine along with their use,
- Instruction set, type of instructions, mode of addressing etc.

Assembly Language programming
- Assembler(TASM/MASM) overview, Assembly instructions for Comparing & Branching, Numeric I/O, Macros, Bit Operations,

Text Book:
- M. Morris Mano, C. R. Kime: Logic and Computer Design Fundamentals, Pearson Education.
- Fundamentals of Computers; Pearson Publication

Reference Book:
- T.C. Bartee: Digital Computer Fundamentals, McGraw Hill, 2001.
- T.L. Floyd: Digital Fundamentals, Pearson Education, 2011.

Board Members:

Semester I

Core Course 1 Practical **Programming Fundamentals using C/C++**

1. Execution of a simple sequential program in C.
2. Using simple C++ formatted and unformatted I/O facilities
3. Execution of a simple program based using if-else, nested if and switch-case
4. Application of goto, break, continue, return etc.
5. Application of iterative constructs
6. Programs using Arrays (1-D & 2-D)
7. Programs using Structures,
8. Using simple and nested control structures.
9. Using User Defined Functions(Interactive & Recursive) Function overloading etc.
10. Using Classes and Objects, friend function.
11. Using Constructors copy constructors and destructors.
12. Using Unary and binary operator Overloading.
13. Using single, multilevel, multiple, hierarchical, hybrid and multipath inheritance.
14. Using virtual base classes and abstract classes.
15. Using wild pointers, void pointer, pointer to class, pointer to object, this pointer.
16. Using pointer to derived and base class, pointer to members.
17. Using arrays and arrays of classes.
18. Manipulating string objects.
19. File handling and command line arguments.

Semester I

Core Course 2 Practical **Programming with assembly language**

1. Programs with strings/characters
2. Programs with numbers
3. Programs with branching
4. Programs with macros and procedures
5. Programs with bit operators

Semester II
Core Course 3:Programming in JAVA **classes : 60**

Object Oriented Concepts:
Recapitulate concepts of Object Oriented Programming, Object, Class, Method, Abstraction, Encapsulation, Polymorphism, Inheritance, Dynamic Binding and Message Passing.

Introduction to Java:
History of JAVA, features of JAVA, types of JAVA programs.

JDK tools:
Java compiler, Java Interpreter, applet viewer, Jot tool, Javap disassemble, Javadoc Tool, Javah tool, java Keywords, data types in java, variable naming conventions, initializing variables, literals, operators, type conversion, looping construct, Arrays.

Classes and objects:
Declaring classes, creating objects, declaring objects, declaring methods, passing arguments to methods, constructors, access specifiers, modifiers, the main () method, Overloading, Relationship between classes.

Inheritance and interfaces:
Types of inheritance, Single inheritance, Multi-level inheritance, interface implementation,

Packages:
Java packages, using a package, the Lang package, the util package, the collection class, creating a package.

Introduction to threads:
Threads, single treaded and multithreaded applications, life cycle of a thread, the current thread, the thread class, problems in multithreading, synchronization.

Exceptions Handling: Types of Errors, Exceptions, Syntax of Exception Handling Code, Multiple Catch Statements, Finally Statements, Throwing out Own exception, Debugging.

Applet & applications:
Applet class, Applet & HTML, Life cycle of an Applet, Graphic class, Font class, passing parameters to applets, creating an application, converting applets to applications.

Books Recommended:
Herbert Schildt- Java: The Complete Reference, Seventh Edition, McGrawHill, 2006
Cay S. Horstmannand, Gary Cornell – Core java, volume1 and 2, 8th-edition, Pearson Education.

Board Members:

Semester II

Core Course 4: Discrete Structures **Classes: 60**

1.Introduction:
Sets - finite and Infinite sets, uncountable Infinite Sets; functions, relations, Properties of Binary Relations, Closure, Partial Ordering Relations; counting - Pigeonhole Principle, Permutation and Combination; Mathematical Induction, Principle of Inclusion and Exclusion.

2.Growth of Functions:
Asymptotic Notations, Summation formulas and properties, Bounding Summations, approximation by Integrals

3.Recurrences:
Recurrence Relations, generating functions, Linear Recurrence Relations with constant coefficients and their solution, Substitution Method, Recurrence Trees, Master Theorem

4.Graph Theory
Basic Terminology, Models and Types, multigraphs and weighted graphs, Graph Representation, Graph Isomorphism, Connectivity, Euler and Hamiltonian Paths and Circuits, Planar Graphs, Graph Coloring, Trees, Basic Terminology and properties of Trees, Introduction to Spanning Trees

5.Prepositional Logic
Logical Connectives, Well-formed Formulas, Tautologies, Equivalences, Inference Theory

Recommended Books:

1. C.L. Liu , D.P. Mahopatra, Elements of Discrete mathematics, 2nd Edition , Tata McGraw Hill, 1985,
2. Kenneth Rosen, Discrete Mathematics and Its Applications, Sixth Edition ,McGraw Hill 2006

3. T.H. Coremen, C.E. Leiserson, R. L. Rivest, Introduction to algorithms, 3rd edition Prentice Hall on India, 2009

4. M. O. Albertson and J. P. Hutchinson, Discrete Mathematics with Algorithms , John wiley Publication, 1988

5. J. L. Hein, Discrete Structures, Logic, and Computability, 3rd Edition, Jones and Bartlett Publishers, 2009

6. D.J. Hunter, Essentials of Discrete Mathematics, Jones and Bartlett Publishers, 2008

Semester II
Core Course 3 practical: Programming in JAVA Lab

- Programming using Java.
- Applet creation and execution.
- Creating programs based on multithreading.

Semester III

Core Course 5: Data Structures with C **Classes: 60**

Introduction to Data Structures

- Primitive/non-primitive data structures and their importance.
- Linear/non-linear data structure and their storage structure.
- Static/Dynamic data structures.

Algorithms:

- Use of asymptotic notations for analysis of complexity of an algorithm.

Arrays :C Implementation

- Traversal, Insertion, Deletion in Arrays.
- 2-D arrays and their row major/column major storage
- Implementation of Matrices in 2-D Arrays.
- Concept of dynamic array in C language.
- Sparse matrices and their 3-Tuple representation.

Sorting And Searching

- Analysis of complexity of Sequential search and Binary search
- Analysis of simple sorting algorithms: Bubble Sort, Selection Sort, Insertion Sort, Merge Sort and Quick Sort

Stacks

- Push And Pop Operations
- Application of Stacks:-prefix, postfix and infix

Queue

- Insertion and Deletion Operations
- Circular Queue
- Deque:-Input restricted and Output restricted

Linked Lists : C Implementation

- Concept of self-referential data structure and runtime allocation/de-allocation of memory in C.

Manipulation (insertion, deletion and traversal) of:

- Singly linked list.
- Doubly linked list.
- Circular linked list.
- Implementation of Stack, Queue using linked list

Trees: Algorithm Only

- Trees, Some Properties of Trees,
- Binary trees, Binary search trees

Graphs: Algorithm Only

- Graphs, Sub graphs, Walks paths and circuits.
- Connected Graphs, Representation of graph in computers Memory.
- Computation of Transitive closure of an adjacency matrix.
- Breadth First Search, Depth First Search,
- Spanning Trees, Finding all Spanning Trees of a Graph.
- Spanning Trees in a Weighted Graph,
- Kruskal's algorithm & Prim's algorithm for finding MST.
- Floyd Warshall Algorithm, Dijkstra's algorithm.

Text Book:

Data Structure-Lipschutz.

References Book:

Graph Theory-Nur Singh Dev.

C and Data Structures, Mukul Priyadarshi.

Data Structures through 'C', Y.P. Kanetkar, BPB Pub.

Introduction to algorithms, T.H. Coremen, C.E. Leiserson, R.L. Rivest and C. Stein: PHI.

Board Members:

Semester III
Core Course6: Operating Systems Classes:60

Introduction to Operating System :
- Definition and type of Operating Systems, role of Operating System as memory manager, I/o manager, process manager and file manager.
- **Computer system structure** :
- Computer System Operation, I/O structure, Hardware protection.

Operating System Structure :
- System Components, System Services, System Calls.

Process Concepts :
- Process state, process control blocks (PCB), process scheduling, schedulers & threading.

CPU Scheduling :
- CPU and I/O burst cycle, Scheduling criteria/algorithms (FCFS, SRTN,RR etc.).

Memory Management :
- Memory hierarchy, properties
- Contiguous & Static/Dynamic Partitioned allocation, paging, swapping, segmentation.

Virtual memory :
- Demand paging, page replacement policies/algorithms (FIFO, LRU, Optimum), thrashing.

File System Structure :
- File allocation (Contiguous, linked, indexed) Free space management (bit vector, linked list etc.).

I/O systems :
- I/O Hardware, Polling, Interrupts, DMA, Spooling, buffering.

Disk structure :
- Disk scheduling (FCFS, SSTF, Scan), Disk management, formatting, boot block, bad block & swap space management.

Security :
- The problem, Authentication, program threats, encryption.

UNIX/LINUX :
- Process scheduling, memory management, file system, file structure, inodes,
- Linux shell Commands: ls, cat, wc, grep, chmod, directory related commands, date, man, cp, mv

Text Books:
- Modern Operating Systems – A. S. Tanenbaum; Pearson Education Asia.
- Operating System Concepts – Silberschatz/Galvin/Gagne; John Wiley & Sons (Asia).

Reference Books:
- Operating System:Naresh Chouhan; Oxford University Press.
- Linux a Practical Approach -- B. Mohamed Ibrahim
- Operating Systems: Er. Rajiv Chopra; S. Chand Publications.

Board Members:

Semester III

Core Paper 7: **Computer Networks** **classes: 60**

Basics of Data Communication

- Communication system, Analog and Digital Communication, Data communication modes, Synchronous and Asynchronous Transmission, Simplex, Half-duplex and Full duplex communication, Networking Protocols and Standards.

OSI and TCP/IP Reference Models

- OSI Model, Need, Basic functions of each layer, TCP/IP, Comparisons with TCP/IP layers.

Modulation, Encoding and Multiplexing

- Analog Modulation: AM, FM, PM.
- Data Encoding: Digital Data Digital Signals: NRZ-L, NRZ-I, Manchester, Differential Manchester.
- Digital Data Analog Signals: ASKFSK, PSK.
- Analog Data Digital Signals: PCM, DM.
- Introduction to FDM, TDM, SDM.

Communication Mediums

- Digital data transmission, Serial and Parallel Transmission, Guided and Unguided mediums, Wireless Communication, Coaxial Cables, Twisted Pair Cables, Fiber Optic Cables, Connectors

Network Classification

- Classification of Networks based on Technology, Scale, Topology and Ownership, LAN overview, LAN Topologies, LAN access methods.

Physical and Data link Layer

- ARQ, CRC, Framing, Retransmission strategies, Random access (CSMA, CSMA/CD, CSMA/CA).

Internetworking Devices & Network layer

Network Interface Cards, Modems, Repeaters, Hubs, Bridges, Switchs and gateways; Circuit, Message and Packet Switching; Routing, Congestion control.

Transport layer and Application Layer

Addressing, Multiplexing, Flow control, Port numbers, DNS, Remote Logging, FTP, Network Management, Client-Server Applications, WWW, E-mail.

Network Security

Introduction to computer security, Authentication and Privacy, Public and Private Key Cryptography, Digital Signature.

Text Books:

WillamStallings-Data and Computer communications, Pearson Education.

Reference Books:

Tannenbaum - Data Communication and Networking.

B.A. Forouzan: Data Communications and Networking. Tata McGraw Hill, 3rd Edition, 2004.

Board Members:

Semester III

Skill Enhancement Paper 1: Android Programming

Introduction: History of Android, Introduction to Android Operating Systems, Android Development Tools, Android Architecture.

Overview of object oriented programming using Java: OOPs Concepts: Inheritance, Polymorphism, Interfaces, Abstract class, Threads, Overloading and Overriding, Java Virtual Machine.

Development Tools: Installing and using Eclipse with ADT plug-in, Installing Virtual machine for Android sandwich/Jelly bean (Emulator), configuring the installed tools, creating a android project – Hello Word, run on emulator, Deploy it on USB-connected Android device.

User Interface Architecture: Application context, intents, Activity life cycle, multiple screen sizes.

User Interface Design: Form widgets, Text Fields, Layouts, Button control, toggle buttons, Spinners (Combo boxes), Images, Menu, Dialog.

Database: Understanding of SQLite database, connecting with the database.

Book Recommended:

1. Android application development for java programmers. By James C. Sheusi. Publisher: Cengage Learning, 2013.

ONLINE READING / SUPPORTING MATERIAL:

1. http://www.developer.android.com
2. http://developer.android.com/about/versions/index.html
3. http://developer.android.com/training/basics/firstapp/index.html
4. http://docs.oracle.com/javase/tutorial/index.htm (Available in the form of free downloadable ebooks also).
5. http://developer.android.com/guide/components/activities.html
6. http://developer.android.com/guide/components/fundamentals.html
7. http://developer.android.com/guide/components/intents-filters.html.
8. http://developer.android.com/training/multiscreen/screensizes.html
9. http://developer.android.com/guide/topics/ui/controls.html
10. http://developer.android.com/guide/topics/ui/declaring-layout.html
11. http://developer.android.com/training/basics/data-storage/databases.html

Semester III

Skill Enhancement Paper 1 Lab: Android Programming lab

1. Create —Hello Worldl application. That will display —Hello Worldl in the middle of the screen in the emulator. Also display —Hello Worldl in the middle of the screen in the

Android Phone.

2. Create spinner with strings taken from resource folder (res >> value folder) and on changing the spinner value, Image will change.

3. Create a menu with 5 options and and selected option should appear in text box.

4. Create a list of all courses in your college and on selecting a particular course teacher-in-charge of that course should appear at the bottom of the screen.

5. Create an application with three option buttons, on selecting a button colour of the screen will change.

6. Create an Login application with username and password. On successful login, pop up the message.

8. Create an application to Create, Insert, update, Delete and retrieve operation on the database.

Semester III

Core Course 5: Data Structures with C Practical

- Using static/dynamic array sort in ascending and descending order:
  (Apply bubble sort, selection sort, insertion sort & quick sort algorithms).
- Searching for an element in an array using linear search and binary search.
- Input sparse matrix and store in 3- tuple scheme.
- Input 3-tuple data and convert it to standard matrix.
- Compute transitive closure of an adjacency matrix.
- Implement singly, doubly and circularly linked list using recursive functions.
- Implement STACK, QUEUE and DEQUEUE using a vector (1-D array)
- Implement STACK & QUEUE using Linked List.
- Searching for an element in a singly, doubly and circularly linked list.
- Write 'C' code to implement and manipulate a Binary Search Tree.

Semester III

Core Course 6 practical: Unix and Shell Programming

1. Some common Unix commands
2. Defining variables
3. Simple operations on variables
4. Shell programs with conditional and loop statements

Semester III
Core Course-7 Practical **Programming with HTML, DHTML and CSS**

1. Use of simple HTML tags
2. Creating lists, tables, forms and frames in HTML
3. Writing CSS
4. Introduction to DHTML

Semester IV
Core Course 8 **VISUAL BASIC. NET** **classes:60**

Introduction to VB.NET
Event Driven Programming, NET as better Programming Platform, NET Framework, NET Architecture, The Just-In-Time Compiler, NET Framework class library introduction.

Elements of User Interface
Windows Forms, Text Boxes, Buttons, Labels, Check Boxes, and Radio Buttons, List Boxes, Combo Boxes. Picture Boxes, Scrollbars, Splitters, Timer, Menus, Built-in Dialogs, Image List, Tree Views, List Views, Toolbars, Status Bar and Progress bars.

Mastering VB Language
Data, Operators, Conditionals and Loops, Procedures, Error Handling, Classes and Objects.

Object Oriented Programming in VB .NET
Class and Object, Properties, methods and events., Constructors and Destructors Method overloading, Inheritance , Access modifiers : Public, Private, Protected, Friend, Overloading and Overriding, Interfaces, Polymorphism.

Exception Handling
Introduction.
Handling different types of exceptions.

Name Spaces
Common Namespaces.

Databases in VB .NET
Database:Connections,Connection to database with server explorer Multiple Table Connection with Data grid.
Crystal Report -Introduction

Text Books:

- Programming Microsoft Visual Basic.NET – Francesco Balena
- The Complete Reference -Visual Basic .NET – Jefrey R. Shapiro
- VB.NET database programming with ADO.NET -Anne Prince and Doug Lowe.

Reference Books:

- The Visual Basic.NET COACH Visual Basic .NET 2003 in 21 Days. – Steven Holzner, SAMS Publications. Mastering Crystal Report - BPB Publication
- Crystal Report – The Complete Reference :- Tata McGraw Hill
- VB. Net-Halls, Macarthy,L.Hotka
- Programming in Vb.Net – V Christy, University Science Press

Board Members:

Semester IV
Core Course 9: Software Engineering classes : 60

PRODUCT and PROCESS :
Software Characteristics, S/w Applications and S/w Crisis, Process, Methods, and Tools and Generic View of S/w Engineering, S/w Process Models: Linear Sequential Model, Prototyping Model, RAD Model, Evolutionary/Incremental Model, Spiral Model and Agile Model.

PROJECT MANAGEMENT CONCEPTS
People (Player, Leader & Team), ***Product*** (S/w scope & Problem decomposition), ***Process*** (Melding Product/Process & Process Decomposition) and ***Project*** (W5HH Principle and Critical Practices).

SOFTWARE PROJECT PLANNING
SRS, Analysis, Control flow model (Data dictionary, DFDs),Data Modeling(ERDs), Estimating, Planning, S/w Scope (Information for Scope/Feasibility), Resources (Human Resources, Reusable S/w and Environmental Resources), S/w Project Estimation and Decomposition Techniques (S/w Sizing, Problem-Based, Process-Based Estimation) COCOMO II model.

PROJECT SCHEDULING AND TRACKING
Basic Concepts & Principles, Relationship Between People and Effort, defining a Task Network (PERT, CPM), Scheduling (Timeline Charts and Tracking the Schedule).

DESIGN CONCEPTS AND PRINCIPLES
S/w Design Engineering, Design Process, Design Principles, Design Concepts (Abstraction, Refinement, Modularity), Effective Modular Design (Functional Independence, Cohesion, Coupling)

SOFTWARE TESTING TECHNIQUES and STRATEGIES
Objectives, Principles & Testability, Test Case Design, White-Box, Basis Path, Control Structure Testing (Condition, Data Flow & Loop Testing), Black-Box, Boundary Value Analysis, Architectures, and Applications, A Strategic Approach to S/w Testing, Verification and Validation, organizing for S/w Testing, S/w Testing Strategy, Unit Testing, Integration Testing (Top-down, Bottom-up, Regression, Smoke) and System Testing.

Quality and Metrics
Quality concepts (what is quality, ISO 9126 quality factors), Factors That Affect Quality,Metrics for Software Quality (Measuring Quality and Defect Removal Efficiency), Process metrics, Project metrics SQA (Six sigma for software engineering),

Text Books:
Roger S. Pressman - Software Engineering A Practitioner's Approach, McGrawHill.
Reference Books:
Ali Behforoz and F. J. Hudson - Software Engineering Fundamentals, Oxford University Press.
Alan Dennis and B. H. Wixom – Systems Analysis and Design An Applied Approach, John Wiley.
Carlo Ghezzi, M. Jazayeri and D. Mandrioli - Fundamentals of Software Engineering, PHI.

Board Members :

Semester IV
Core Course 10: Database Management System classes : 60

DBMS basics
- Data, Data Bank, Database, DBMS, Types of DBMS, Advantages/Disadvantages in comparison with conventional file system, 3-Level Abstraction of DBMS and Database Life Cycle.

RDBMS basics
- Relation, Codd's Rules, RDBMS, Super Key, Candidate Key, Primary Key, Alternate Key, Secondary Key, Foreign Key, Discriminator and Surrogate Key.

ER Model
- Entity, Entity Set, Weak Entity Type, Relationship, Attributes, Domain, Degree of Relationship, Connectivity & Cardinality of Relationship, Existence of Relationship, Attributes of a relationship, Generalization, Specialization, Aggregation.

Normalization:
- Normalization, desirable properties, insert, update, Delete anomalies & reduction in redundancy, FD, 1NF, 2NF, 3NF, BC/NF, MVD 4NF, JD, 5NF or PJ/NF, DK/NF and De-normalization.

Transaction Concept:
- Transaction, ACID properties, Transaction States, Concurrent Executions, Serializability, conflict& view serializability,
- Deadlock: When occur, Detection, Prevention and Avoidance.

Relationship algebra & Calculus
- Project, Select, Compose, Rename, Cartesian Product, Join (equi, natural, θ& Outer join), Union, Intersection, Difference, Division operations, Tuple Relational Calculus, Domain Relational Calculus.

Oracle SQL [15 hrs.]:
SQL *Plus: Buffer Commands, Environment variables and Data Types.
Basic parts of speech in SQL: select, from, where, order by, having, group by.
Arithmetic Operators: Unary (+, –), Binary (*, /,+, –); Comparison Operator: =, !=, <>, >, <, >=, <=, IN, NOT IN, IS NULL, IS NOT NULL, LIKE, % or _, ALL, ANY, SOME, EXISTS, BETWEEN; Logical Operators: AND, OR, NOT, Set Operators: UNION, UNION ALL, INTERSECT, MINUS.
DQL: Data Query Language – SELECT.
DML: Data Manipulation Language(INSERT, UPDATE, DELETE).
DDL: Data Definition Language (CREATE, ALTER, DROP, RENAME).
TCL: Transaction Control Language (COMMIT, ROLLBACK, SAVEPOINT).
DCL: Data Control Language (GRANT, REVOKE).
Handling Database Objects like Table, View,
Concept of simple query, nested sub-query, self-join, equi-join,
PL/SQL: Introduction, Simple Procedure, Function.

Text Books:
- Silberschatz, Korth, Sudarshan – Database System Concepts, McGraw Hill.
- Ivan Byross - PL/SQL Programming.

Reference Books:
- Toby Teory et al., Database Modelling and Design, Morgan Kaufman Publishers.
- C. J. Date - Database management System.
- Alexis Leon, Mathews Leon – SQL A Complete Reference, TMH.
- V.P. Desai - Database management System.
- Sharad Maheswari and Ruchin jain–SQL and PL/SQL Programming's.

Board Members :

Semester IV
Skill Enhancement Paper 2: MATLAB/ Scilab Programming

Unit I Programming Environment: MATLAB/ Scilab Windows, A First Program, Expressions, Constants, Variables and assignment statement, Arrays.
Unit II Graph Plots: Basic plotting, Built in functions, Generating waveforms, Sound replay, load and save.
Unit III- Procedures and Functions: Arguments and return values, M-files, Formatted console input-output, String handling.
Unit IV-Control Statements: Conditional statements: If, Else, Else-if, Repetition statements: While, for loop.
Unit V- Manipulating Text: Writing to a text file, Reading from a text file, Randomizing and sorting a list, searching a list.

Recommended Books:
1. MATLAB: An Introduction with Applications, by Amos Gilat, 2nd edition, Wiley, 2004,

2. C.B. Moler, Numerical Computing with MATLAB, SIAM, 2004.

Software Lab Based on MatLab

Semester IV
Core Course 8Practical: VISUAL BASIC. NET

- Console Based Programming
- Window Based Programming
- Application Development using Database connectivity

Semester IV
Core Course-9 Practical Software Engineering Practical

1. Creation of SRS according to IEEE standards for given Software Project
2. Case Study of
    a. Online shopping system
    b. Online Hotel management
    c. Online Tourism
    d. Hospital Management
    e. Online Assessment system
    f. Parking App
    g. Food delivery app

Or given software.

Semester IV
Core Course 10 Practical:Database Management System Lab

SQL * plus and SQL Commands:

- Use of SQL *Plus Buffer Commands, Environment variables and Data Types.
- Use of select, from, where, order by, having, group by.
- Use of IN, NOT IN, IS NULL, IS NOT NULL, LIKE, % or _, ALL, ANY, SOME, EXISTS, BETWEEN.
- Use of AND, OR, NOT, UNION, UNION ALL, INTERSECT, MINUS in SQL.
- Using DDL and DML with database objects like Table, View, Sequence, Synonym and Index.
- Use of COMMIT, ROLLBACK, SAVEPOINT.
- GRANT & REVOKE privileges on database objects.
- Use of sub-query, correlated sub-query, self-join, equi-join,
- Displaying data from multiple tables.
- Producing Readable output using SQL * plus.

Semester V
Core Course 11: Internet Technologies classes : 60

HTML
Introduction to HTML,Basic -Tags Head, Body, Font, Colors, Attribute, List, Ordered and Unordered, Links, Images, Tables, Form,. CSS

JavaScript
Data types, operators, functions, control structures, events and event handling. ,
Working with Result Set Objects.

JSP
Introduction to JavaServer Pages, HTTP and Servlet Basics, The Anatomy of a JSP Page, JSP Processing, JSP Application Design with MVC, Setting Up the JSP Environment, Implicit JSP Objects, Conditional Processing, Displaying Values, Using an expression to Set an Attribute, Declaring Variables and Methods, Error Handling and Debugging, Sharing Data Between JSP Pages, Requests, and Users, Database Access.

JDBC
JDBC Fundamentals, Establishing Connectivity and working with connection interface, Working with statements, Creating and Executing

Recommended Books:
1. Ivan Bayross, Web Enabled Commercial Application Development Using Html, Dhtml,javascript, Perl Cgi , BPB Publications, 2009.
2. Cay Horstmann, BIG Java, Wiley Publication , 3rd Edition., 2009
3. Herbert Schildt , Java 7, The Complete Reference, , 8th Edition, 2009.
4. Jim Keogh ,The Complete Reference J2EE, TMH, , 2002.
5. O'Reilly , Java Server Pages, Hans Bergsten, Third Edition, 2003.

Semester V

Core Course 12: Theory of Computation classes: 60

Mathematical Preliminaries:
Sets Relations, Functions, Graph and Trees, Strings and their properties, Principles of Induction

Propositions and Predicates:
Proposition (or statements), Propositional connectives, Well formed formulae, tautology, Predicates, Universal and Existential qualifiers.

Theory of Automata:
Definition, Description of finite Automata, Transition System, Properties of transition system. Acceptability of a string by finite automata, Non-deterministic finite state machine.

Formal Languages:
Basic Definition and examples, Chomsky classification of languages, languages and their relations, operations on languages, languages and automata

Regular Set and Regular Grammar :
Regular Expressions, Finite automata and Regular Expressions, Pumping Lemma for regular Sets, closure properties of regular set, Regular set and Regular Grammar.

Context – free languages:
Basic definition, Context-free languages and derivation trees, Normal forms of context free grammar.

Pushdown Automata:
Basic definition, Acceptance by pda, pushdown Automata and context-free languages, parsing and pushdown Automata.

Turing Machine and Linear bounded Automata:
Turing Machine Model, Representation of Turing machines, language acceptability by Turing machines, design of Turing Machines.

Text Books:

M. Sipser - Introduction to the theory of computation, Thomson Learning, 2001.

Reference Books:

- J. Martin - Introduction to languages and the Theory of computation, 3rd edition, McGraw Hill, 2002.
- K.L.P.Mishra- Theory of Computer Science , PHI Publication.
- J. E. Hopcroft, R. Motwani and J.D. Ullman - Introduction to Automata Theory, Languages and Computation, 2nd Edition, Pearson Education, 2001.

Board Members:

Semester V

Discipline Specific ElectivePaper 1: Information Security and Cyber Law

Introduction

Security, Attacks, Computer Criminals, Security Services, Security Mechanisms.

Cryptography

Substitution ciphers, Transpositions Cipher, Confusion, diffusion, Symmetric, Asymmetric Encryption. DES Modes of DES, Uses of Encryption, Hash function, key exchange, Digital Signatures, Digital Certificates.

Program Security

Secure programs, Non malicious Program errors, Malicious codes virus, Trap doors, Salami attacks, Covert channels, Control against program

Threats.

Protection in OS: Memory and Address Protection, Access control, File Protection, User Authentication.

Database Security

Requirements, Reliability, Integrity, Sensitive data, Inference, Multilevel Security.

Security in Networks

Threats in Networks, Security Controls, firewalls, Intrusion detection systems, Secure e-mails

Administrating Security

Security Planning, Risk Analysis, Organisational Security Policy, Physical Security. Ethical issues in Security: Protecting Programs and data. Information and law.

IT Act 2000

Scope of the IT Act ,Legal recognition of Electronic records and Digital Signature, use of electronic records and digital signature in government and its agencies.

Certifying Authorities:

Need and Power of certifying Authority, Appointment, Function of Controller, who can be a certifying Authority? Digital signature certifications, Generation, Suspension and Revocation of Digital signature certificate.

Domain name Disputes and Trademark Law:

Concept of Domain names, New concepts in trademark Jurisprudence, Cyber squatting, Reverse Hijacking, Jurisdiction in Trademark dispute.

Cyber regulations Appellate Tribunal:

Establishment and Composition of Appellate tribunal ,Powers of Adjudicating officer to Award Compensation, Powers of Adjudicating officer to Impose Penalty.

The cyber crimes(S-65 to S-74):

Tampering with computer source document(S-65), Hacking with Computer system(S-66), Publishing of information which is Obscene in Electronic forms(S-67), Offences-Breach of Confidentiality and Privacy(S-72), Offences- Related to Digital signature certificate(S-73 and S-74)

Recommended Books:

1. C. P. Pfleeger, S. L. Pfleeger; Security in Computing, Prentice Hall of India, 2006

2. W. Stallings; Network Security Essentials: Applications and Standards, 4/E, 2010

Semester V

Discipline Specific ElectivePaper 2: Programming in Python

Introduction to Python:
Python Interpreter, Using Python as calculator, Python shell, Indentation. Atoms, Identifiers and keywords, Literals

Introduction to programming in Python:
Variables and built-in types(strings, lists, tuples, dictionaries, sets), Operators in python, Input and Output Statements, multi-dimensional lists

Control statements:
Branching, Looping, Conditional Statement, Exit function, Difference between break, continue and pass

Functions:
Defining Functions, default arguments

Classes and Objects:
Defining classes, constructor, destructor, inheritance, super() function and MRO overriding methods, Special/magic methods and operator overloading

File Handling:
File object, opening and closing files, reading and writing to text files, csv files and binary files

Reference Books

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011
2. Python Tutorial/Documentation www.python.or 2015
3. Allen Downey, Jeffrey Elkner, Chris Meyers , How to think like a computer scientist : learning with Python , Freely available online.2012
4. http://docs.python.org/3/tutorial/index.html
5. http://interactivepython.org/courselib/static/pythonds
6. http://www.ibiblio.org/g2swap/byteofpython/read/

Semester V
Discipline Specific ElectivePaper 2 lab: Programming in Python lab

1. Programs with lists, tuples and dictionaries
2. Program performing various set operations
3. Programs with different matrix operations
4. Programs with control statements
5. Programs with functions and default parameters
6. Programs with classes, inheritance and operator overloading
7. Programs with text and binary files

Semester V

Core Paper 11 Practical: Internet Technologies Lab

- Web page creation with HTML tags, CSS .
- Adding lists, tables, pictures etc to web pages
- Event driven programming using JS

Semester VI
Core Course 13: Artificial Intelligence Classes : 60

Introduction to AI
AI technique,importance, Task domains of Artificial intelligence, Intelligent System.

State Space Search :
Defining the problem as a State Space search, Strategies for State Space Search, Implementation for Graph Search, Production System-Characteristics, Components, Advantages, Applicability, Learning - Definition and classification.

Knowledge Representation :
Representation and mappings, approaches to knowledge representation, Knowledge representation using Predicate logic, Representing simple facts in logic, Representing instance and ISA relationships, Knowledge Representation using Rules- Procedural Versus Declarative Knowledge and knowledge Acquisition.

Heuristic Search:
Generate and Test, Heuristic Search Techniques (Hill-climbing Heuristic, Best-first Search), Admissibility, Monotonicity, and Informedness and Heuristic Classification.

Expert Systems :
Introduction, Features, characteristics, Architecture, goals, advantages, Difference between Expert system and conventional method, Stages in the Development of an Expert System.

Fuzzy Systems :
Introduction, Crisp Sets, Fuzzy sets, Basic terms and operation , Fuzzy Relations, Arithmetic Operations of Fuzzy Numbers, Linguistic Descriptions, Fuzzification.

Artificial Neural Networks :
IntroductionArtificial Neural Networks Architecture, Features of Artificial Neural Networks, Back propagation Training Algorithms.

Text Book:
N. P. Padhy – Artificial Intelligence and Intelligent Systems, Oxford University Press.

Reference Book:
Patterson, Dan W. – Introduction to Artificial Intelligence and Expert Systems, PHI.

Board Members :

Semester VI

Core Course 14: Computer Graphics Classes : 60

Introduction to Computer Graphics and its Applications

Overview of Graphics Systems

- CRT:- Refresh CRT, Raster Scan Display, Color CRT
- Flat Panel Displays:- Plasma Panel, LED, LCD,
- Input devices:- Mouse, Track ball & space ball, joysticks, Data gloves, digitizers, image Scanners, touch panels, light pens,voice systems.
- Hard copy Devices

Graphics Software

- Classification of Graphics Software
- Coordinate representations And Homogeneous Coordinates
- Software standards.

Output Primitives

- Points and Lines.
- Line drawing algorithms: DDA Algorithms, Bresenham's Algorithm
- Circle generation algorithm
- Curves: Conic Section, Polynomial and spline curves

Filled Area Primitives

- Scan-line polygon fill algorithm,
- Flood fill algorithm.

Two-Dimensional Geometric Transformations

- Translation, Rotation, Scaling, Composite Transformation, Reflection & Shear.

Two-Dimensional Viewing

- Viewing Coordinates & window coordinates
- Line Clipping: Cohen-Sutherland line clipping algorithm.

Three-Dimensional Geometric Transformations

- Translation, Rotation, Scaling, Composite Transformation,

Visible Surface Detection methods

- Classification of methods.
- Backface Detection: - Depth Buffer methods, Scan-line method.
- Visible face detection
- Curve Surfaces: Surface Contour Plots.

Introduction to Computer Animation

- Twinning, Interpolation
- Morphing, Warping, Color Dissolving.

Multimedia : Introduction.

Text Book:

Donald Hearn, M. Pauline Baker – Computer Graphics, PHI

Reference Book:

D.P. Mukherjee – Fundamentals of Computer Graphics and Multimedia, PHI.

Semester VI

Discipline Specific ElectivePaper 3: Data Mining, Warehousing& Big Data

Data Mining]:
Introduction, KDD, Mining Concept and Need,Stages, Methodology, Data objects and attributes: Nominal, Binary, and Ordinal, Numeric,measuring similarities among data sets, Measuring distances.

Data mining techniques:
Classification, classification techniques-Baye's Theorem, Decision Tree Induction, Rule based classification,Clustering techniques- Introduction, Requirements, Overview of basic Clustering methods, partitioning method- K-means, Hierarchical methods, Agglomerative vs. Divisive Hierarchical Clustering.

Data pre-processing:
Data Quality, Data Cleaning, Data integration, data reduction, Data transformation and Data discretization, Histograms, Sampling.

Data Warehousing :
Data Warehouse basic concept, Data Warehouse Modeling, Data Analysis, MOLAP, Data Cube and OLAP, Data warehouse design and usages, Data Warehouse environment, Architecture of a data warehouse.

Big Data Analytics:
Introduction, Data life cycle (traditional data mining big data life cycle) Methodology, four deliverables, stakeholders, data analyst, data scientist

Big data project:
Problem identification and definition, data collection, data cleaning, data summarization, data exploration and visualization.

Text Books:
Jiawei Han, Kamber – Data Mining Concepts and Techniques, Morgan Kaufmann Publishers.

Reference Books:
Pudi & Krisna-Data Mining, Oxford University Press
ReemaThareja - Data Warehousing, Oxford University Press.
Anahorys, S., Murray, D; 2008; Data Warehousing in Real World, Pearson Publication.

Discipline Specific ElectivePaper 3 Practical: Data Mining, Warehousing & Big Data Practical

Classification and clustering algorithms

Big Data Management

Semester VI
Discipline Specific ElectivePaper 4: Final Year Project and Job Training

Software Project (80 marks)

- Web based
- Android Application
- Desktop based projects
- Animations and games
  Or
  Any type according to current technologies and trends

Job Training (20 marks)

Semester VI

Core Course 13 practical: Artificial Intelligence Practical

Practical with prolog/ Scilab/ Matlab

1. Introduction of prolog/ Scilab/ Matlab
2. Implementation of search technics
3. Plotting fuzzy membership functions
4. Creating neural networks

Semester VI

Core Course 14 practical: Computer Graphics with C Practical

1. Graphical functions in C
2. DDA line drawing algorithm
3. Bresenham's Line drawing algorithm
4. Flood-fill algorithm
5. Line clipping algorithm
6. Drawing curves
7. Drawing Circles