

# **DEPARTMENT OF INFORMATION TECHNOLOGY**

**RAYAGADA AUTONOMOUS COLLEGE, RAYAGADA**

## **Syllabus for B. Sc. Information Technology (Hons) under CBCS w.e.f. the Academic Year 2022-2023**



**ACADEMIC SESSION 2022-2025**

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## 1<sup>st</sup> Semester

Paper	Subjects	No. of Credits	Full Marks
Core – 1	Programming Fundamentals using C	4	60+15=75
Core – 1	C Programming Lab	2	25
Core – 2	Computer System Architecture	4	60+15=75
Core – 2	Computer System Architecture Lab	2	25
GE-1(Generic Elective)	<From other subject>	6	
AECC-1(Ability Enhancement Compulsory Course)	Environmental Studies		

## 2<sup>nd</sup> Semester

Paper	Subjects	No. of Credits	Full Marks
Core – 3	Data Structures	4	60+15=75
Core – 3	Data Structure Lab	2	25
Core – 4	Data Communication and Networking	4	60+15=75
Core – 4	Data Communication and Networking Lab	2	25
GE-2(Generic Elective)	<From other subject>	6	
AECC-2(Ability Enhan. Compulsory Course)	MIL Communication		

### 3<sup>rd</sup> Semester

Paper	Subjects	No. of Credits	Full Marks
Core – 5	Object Oriented Programming in C++	4	60+15=75
Core – 5	C++ Programming Lab	2	25
Core – 6	Operating Systems	4	60+15=75
Core – 6	Operating Systems Lab	2	25
Core – 7	Internetworking	4	60+15=75
Core – 7	Internetworking Lab	2	25
GE-3(Generic Elective)	<From other subject>	6	
SEC-1(Skill Enhancement Course)	Communicative English		

### 4<sup>th</sup> Semester

Paper	Subjects	No. of Credits	Full Marks
Core – 8	E-Commerce	4	60+15=75
Core – 8	E-Commerce Lab	2	25
Core – 9	Software Engineering	4	60+15=75
Core – 9	Software Engineering Lab	2	25
Core – 10	Database Management Systems	4	60+15=75
Core – 10	Database Lab	2	25
GE-4(Generic Elective)	<From other subject>	6	
SEC-2(Skill Enhancement Course)	Logical Thinking and Quantitative Aptitude		

**5<sup>th</sup> Semester**

<b>Paper</b>	<b>Subjects</b>	<b>No. of Credits</b>	<b>Full Marks</b>
<b>Core – 11</b>	Web Technology	<b>4</b>	<b>60+15=75</b>
<b>Core – 11</b>	Web Technology Lab	<b>2</b>	<b>25</b>
<b>Core – 12</b>	Java Programming	<b>4</b>	<b>60+15=75</b>
<b>Core – 12</b>	Java Programming Lab	<b>2</b>	<b>25</b>
<b>DSE – 1(Discipline Specific Elective )</b>	Computer Graphics	<b>4</b>	<b>60+15=75</b>
<b>DSE –1(Discipline Specific Elective )</b>	Computer Graphics Lab	<b>2</b>	<b>25</b>
<b>DSE –2(Discipline Specific Elective )</b>	Artificial Intelligence	<b>4</b>	<b>60+15=75</b>
<b>DSE –2(Discipline Specific Elective )</b>	Artificial Intelligence Lab	<b>2</b>	<b>25</b>

**6<sup>th</sup> Semester**

<b>Paper</b>	<b>Subjects</b>	<b>No. of Credits</b>	<b>Full Marks</b>
<b>Core – 13</b>	Programming in Visual Basic	<b>4</b>	<b>60+15=75</b>
<b>Core – 13</b>	Visual Basic lab	<b>2</b>	<b>25</b>
<b>Core – 14</b>	Data Warehousing and Data Mining	<b>4</b>	<b>60+15=75</b>
<b>Core – 14</b>	Data Warehousing and Data Mining Lab	<b>2</b>	<b>25</b>
<b>DSE – 3 (Discipline Specific Elective )</b>	Cloud Computing	<b>4</b>	<b>60+15=75</b>
<b>DSE –3(Discipline Specific Elective )</b>	Cloud Computing Lab	<b>2</b>	<b>25</b>
<b>DSE – 4 (Discipline Specific Elective )</b>	Project/Android Programming	<b>4</b>	<b>60+15=75</b>
<b>DSE – 4</b>	Project/Android Programming Lab	<b>2</b>	<b>25</b>
<b>Total</b>			

## SEMESTER - I

### Core – 1

#### Programming Fundamentals using C

##### Unit -1

Overview of Procedure oriented programming, Data types, Defining and Initializing Variables, Scope of Variables, Keywords, Casting of Data Types, Operators (Arithmetic, Relational, and Logical), main() function, Compiling and Executing a program, Using Comments in programs, Character I/O (getc, getchar, putc), printf(), scanf(), Basic Header Files (stdio.h, conio.h, math.h, string.h, etc).

##### Unit -2

Simple Expressions in C, Understanding precedence of Operators in Expressions, Conditional Statements (IF, IF... ELSE, Nested IF, Switch-Case), Iterative Statements (FOR, WHILE, and DO-WHILE), Use of BREAK and CONTINUE in Loops, Nested loops.

##### Unit -3

Use of functions, Call by Value, Call by Reference, Functions returning value, Void function, One Dimensional Arrays (Declaring 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, Working with Rows and Columns of a matrix.

##### Unit -4

Understanding use of structures, Declaring, initializing and using simple structures, Manipulating individual members of structures, Array of Structures, Understanding Pointer Variable, Simple use of Pointers, Pointer arithmetic, Differentiating between static and dynamic memory allocation, use of malloc and calloc functions, Simple file handling operations.

##### Books:

1. Programming in ANSI C - E. Balguruswamy, TMH
2. Let us C - Yaswant Kanitkar, BPB

#### Marks Distributions

Internal -----15 Marks (1Hrs.)

Term End Examination -----60 Marks (3 Hrs.)

## Core - 1

### C Programming Lab

1. Write a program to find the maximum among three numbers.
2. Write a program to find factorial of a number.
3. Write a program to print the Fibonacci series.
4. Write a program to print the prime numbers between 1 to n.
5. Write a program to check if it a Palindrome (e.g., madam).
6. Write a program to check if it is an Armstrong number. (An Armstrong number of three digits is an integer such that the sum of the cubes of its digits is equal to the number itself)
7. Write program to reverse the digits of an input number.
8. Write a program to find the sum of digits of a number.
9. Write a program to find the GCD and LCM of two numbers.
10. Write a program to perform different arithmetic operations using switch....case.
11. Write a program to count the number bits —1|| in a given binary number.
12. Write a program to find the factorial of a number using function.
13. Write a program to perform the arithmetic operations using function.
14. Write a program to find the largest element in an array.
15. Write a program to add two matrices.
16. Write a program to multiply two matrices.
17. Write a program to find the position of a given character in a string.
18. Write a program to count the number of times a character occurs in a string.
19. Write a program to create records of 10 students using structure.
20. Write a program to count the number of words, number of lines in a text file.

### Marks Distributions

**Experiments – 2 X 7.5 =15**

**Record - = 05**

**Viva-Voce- =05**

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**Total=25**

**Core – 2**

**Computer System Architecture**

**Unit -1**

Number systems – Decimal, Binary, Octal and Hexa-decimal number systems and their inter conversion, 1's & 2's complement, Arithmetic operations on Binary numbers, Overflow & underflow. Logic Gates, AND, OR, NOT gates and their Truth tables, NOR, NAND & XOR gates, Boolean Algebra – Basic Operations and Boolean Law's, Demorgan's theorem.

**Unit -2**

Sum of Product & Product of Sum, K-Map, Combinational & Sequential circuits, Half Adder & Full Adder, Adder & Subtractor, Multiplexer, De-multiplexer, Encoder, Decoder.

**Unit -3**

Flip-flops - RS, D, JK & T Flip-flops, Registers, Shift Registers, Counters.

**Unit -4**

Central Processing Unit: General register organisation, Stack organisation, Instruction Formats, Addressing modes, Memory: Main memory, Auxiliary memory, DMA- control signals for DMA transfers, Block diagram of DMA controller, DMA transfer in a microcomputer system.

**Books:**

1. Computer System Architecture - M. Mano, Pearson Education
2. Computer Organization, Fifth edition - Carl Hamacher, McGrawHill
3. Digital Design - M. M. Mano, Pearson Education Asia
4. Computer Fundamentals - B. Ram, New Age International Publishers

**Marks Distributions**

**Internal -----15 Marks (1Hrs.)**

**Term End Examination -----60 Marks (3 Hrs.)**

## Core – 2

### Computer System Architecture Lab

Topics to be covered in this lab are:

1. Introduction to different operating Systems such as Windows 7, Windows 8, UNIX and Linux etc.
2. Creation of folder and files in windows and LINUX
3. Discussion on doing copy and paste option in windows.
4. Using of CD Drive, Pen drive etc.
5. Use of Microsoft word, Microsoft Excel and Microsoft PowerPoint( Each software to be trained to the students)
6. Use of Internet and its uses
7. Learning of Assembly language programming( practical's to be done in Assembly language are as follows
  - a. Program to print the digits 0, 1,2.....9.
  - b. Program to check whether the number inputted is prime or not
  - c. Program to find the no. of occurrences of character 'c' in the input string
  - d. Program that prompts the user to enter an array of size 10 and display it.
  - e. Program to check whether the input string is palindrome or not
  - f. Program to Convert Decimal number to Hexadecimal number
8. Preparation of Presentation Slides on a particular topic

### Marks Distributions

**Experiments – 2 X 7.5 =15**

**Record - = 05**

**Viva-Voce- =05**

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## SEMESTER - II

### Core – 3

#### Data Structures

##### Unit -1

Primitive and non-primitive data types, Linear and non-linear data structures, Memory representation of Arrays (Single and Multi-dimensional Arrays), Representation of Stack, Queue, and Circular Queue, Insertion and deletion operations on these data structures, Applications of stack and Queue: Evaluation of recursive functions, Job Queues.

##### Unit -2

Limitations of Array representation, Linked List and its advantages, Representation of Singly, Doubly and Circularly linked Lists, Insertion and deletion operations on these data structures, Link list representation for Stack and Queue, Applications of linked list: Representation of polynomials, Sparse Matrix and its representation using Array and Linked list.

##### Unit -3

Introduction to Tree as a data structure, Binary Tree: Definition, related terminologies, Memory representation of Binary tree using array and linked list, Operations such as Inorder, Preorder, and Post order Traversals (recursive algorithms only), Binary Search Tree, Threaded Binary Tree (Representation only), Concept of Height-Balanced Tree.

##### Unit -4

Searching and Sorting techniques: Linear Search, Binary Search, Comparison of Linear and Binary Search, Selection Sort, Bubble sort, Insertion Sort, Comparison of Sorting techniques. Merging of arrays.

##### Books:

1. Data Structures, Schaume's Outlines, By Lipschutz TMH Publications
2. Data Structures, By Ellis Horowitz, Sartaj Sahani, Galgotia Publications
3. Data Structures using C & C++ By Aaron M. Tenenbaum, Yedidyah Langsam PHI

#### Marks Distributions

Internal -----15 Marks (1Hrs.)

Term End Examination -----60 Marks (3 Hrs.)

## Core – 3

### Data Structure Lab

1. Write a program in C to search for an item in an array and display its position using Linear search.
2. Write a program in C to search for an item in an array and display its position using Binary search.
3. Write a program in C to arrange a set of numbers in ascending order of values using Selection sort technique.
4. Write a program in C to arrange a set of numbers in ascending order of values using Bubble sort technique.
5. Write a program in C to perform Insertion and Deletion operations in a Stack represented as an array.
6. Write a program in C to perform Insertion and Deletion operations in a Queue data structure represented as an array.
7. Write a program in C to perform Insertion and Deletion operations in a Circular Queue represented as an array.
8. Write a program in C to perform Insertion and Deletion operations in a Stack represented as a linked list.
9. Write a program in C to perform Insertion and Deletion operations in a Queue data structure represented as a linked list.
10. Write a program in C to merge two sorted arrays.

### Marks Distributions

**Experiments – 2 X 7.5 =15**

**Record - = 05**

**Viva-Voce- =05**

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**Core – 4**

**Data Communication and Networking**

**Unit - 1**

Overview of Data Communications and Networking: Introduction, Network Models

Physical Layer: Signals, Digital Transmission, Analog Transmission, Multiplexing, Transmission Media, Circuit Switching and Telephone Network.

**Unit - 2**

Data Link Layer: Error Detection and Correction, Data Link Control and Protocol, Point to Point Access: PPP, Multiple Access, Local Area Networks: Ethernet, Wireless LANs, Backbone Networks, Virtual LANs, Cellular Telephone and Satellite Networks, Virtual Circuit Switching.

**Unit - 3**

Network Layer: Host-to-Host Delivery: Internetworking, Addressing and Routing, Network Layer

Protocols: ARP, IPv4, ICMP, and IPv6, Routing, Unicast and Multicast Routing

**Unit - 4**

Transport Layer: Process-to-Process Delivery: UDP and TCP, Congestion Control.

Application Layer: Client-Server Model, Socket Interface, Domain Name System (DNS), Electronic Mail (SMTP), and File Transfer (FTP), HTTP and WWW.

**Books:**

1. Data Communications and Networking - B A Forouzan, TMH.
2. Computer Networks - A S Tanenbaum, PHI
3. Data and Computer Communications - W Stallings, PHI

**Marks Distributions**

**Internal -----15 Marks (1Hrs.)**

**Term End Examination -----60 Marks (3 Hrs.)**

## Core – 4

### Data Communication and Networking Lab

1. Simulate Cyclic Redundancy Check (CRC) error detection algorithm for noisy channel.
2. Simulate and implement stop and wait protocol for noisy channel.
3. Simulate and implement go back n sliding window protocol.
4. Simulate and implement selective repeat sliding window protocol.
5. Simulate and implement distance vector routing algorithm
6. Simulate and implement Dijkstra algorithm for shortest path routing.

### Marks Distributions

Experiments – 2 X 7.5 =15

Record - = 05

Viva-Voce- =05

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Total=25

## SEMESTER - III

### Core – 5

#### Object Oriented Programming in C++

##### Unit -1

Object Oriented Programming concept, Procedural vs OOP programming, OOP terminology and features, Tokens, Character set, Keywords, Data-types, Constants and variables, expressions, Standard Library and header files. Operator and Expressions: Arithmetic Operator, Increment/Decrement Operator, Relational Operator, Logical Operator and conditional operators, library functions, Logical Expressions.

##### Unit - 2

Control statements, IF, IF ...ELSE, Nested IF, Switch....Case, Looping statements, While, Do-while, For statements, nested loops. Classes and Objects: Need for Classes, Declaration of Classes, referencing class Members, Data members and member Functions, Inline Functions, Creation of object.

##### Unit-3

Use of access specifiers, Public and Private, Function Overloading, use of Constructors and Destructors, Types of constructors: default, parameterized, and copy constructors, Operator overloading, Friend function, Arrays-of-objects.

##### Unit - 4

Concept of Inheritance, Types of inheritance: Single level, multi-level, multiple, hybrid, Use of protected access specifier, Function overriding, Exception handling, Simple file handling.

##### Books:

1. Object Oriented Programming with C++ -E. Balaguruswamy, TMH
2. Let us C++ -YashavantKanetkar, BPB
3. Object Oriented Programming with C++ -Sourav Sahay, Oxford University Press
4. The C++ Programming Language - Bjarne Stroustrup, Addison-Wesley

##### Marks Distributions

Internal -----15 Marks (1Hrs.)

Term End Examination -----60 Marks (3 Hrs.)

**Core – 5**

**C++ Programming Lab**

1. Define a class called STUDENT with the data members Roll No., Name, Marks secured in five subjects. Write member functions to do the following:
  - i. Read data
  - ii. Find the total mark and division
  - iii. Display Roll No., Name, Total mark, and Division
2. Define a class called SHAPE with appropriate data members. Find the area of different geometrical shapes using function overloading.
3. Define a class called ACCOUNT with the data members Account no. Customer name, Amount and initialize with suitable constructor. Write member functions to do the following:
  - i. Deposit amount
  - ii. Withdraw amount
  - iii. Check balance
4. Using operator overloading add two given Lengths expressed as Feet and Inch.
5. Using operator overloading add two given TIMES expressed as Hour : Minute : Second.
6. Concatenate two strings by overloading the `+=` operator.
7. Define a class called PLAYER with the data members Player ID, player name, highest runs scored, batting average, and number of wickets taken. Create 10 player instances (using array of objects) and initialize them with parameterized constructors. Write a member function to display the details of a player on inputting the player ID.
8. Define a class called PERSON with the data members Name, DOB, PAN #. Inherit two classes from it (i) CUSTOMER with A/C no. & Amount and (ii) EMPLOYEE with Organization, Designation & Salary. Write suitable member functions to do the following:
  - i. Input data for both base as well as derived class objects
  - ii. Display customer details along with name, DOB and PAN #
  - iii. Display employee details along with name, DOB and PAN #
9. Define a class called STACK and implement the PUSH and POP operations on it.
10. Define a class called QUEUE and implement the Insertion and Deletion operations on it.

**Marks Distributions**

**Experiments – 2 X 7.5 =15**

**Record - = 05**

**Viva-Voce- =05**

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**Total=25**

**Core – 6**

**Operating Systems**

**Unit -1**

Introduction, Basic OS functions, resource abstraction, types of operating systems–Batch, Multi programming, Time sharing, and Real time systems; operating systems for personal computers, Operating System Organization, Processor and user modes, kernels, system calls and system programs.

**Unit -2**

Process Management, Process State Transition diagram, Non-pre-emptive and pre-emptive scheduling algorithms: FCFS, Shortest Job First, Round Robin, Priority Scheduling, Concurrent processes, concept of critical section, semaphores, Concept of Deadlock, Condition for deadlock. Concept of deadlock prevention, detection and recovery.

**Unit -3**

Memory Management, Physical and virtual address space, memory allocation strategies: fixed and variable partitions, Paging, Segmentation, Demand paging, virtual memory, Page replacement techniques (FIFO, LRU and Optimal).

**Unit -4**

File and I/O Management, Directory structures:Single level, multi-level, and tree structured directory, Concept of file, file operations, file allocation methods, Disk scheduling techniques(FCFS, Shortest Seek Time First, and Scan), File Protection and Security Policy, File Authentication andAccess control.

**Books:**

1. Operating Systems Concepts -A. Silberschatz and P.B. Galvin, John Wiley
2. Operating Systems - A Concept based Approach – D M Dhamdhere, TMH
3. Modern Operating Systems - A.S. Tanenbaum, Pearson Education
4. Operating Systems - Concepts and design- M. Milenkovic, Tata McGraw Hill

**Marks Distributions**

**Internal -----15 Marks (1Hrs.)**

**Term End Examination -----60 Marks (3 Hrs.)**

**Core – 6**

**Operating Systems Lab**

1. Write program to implement FCFS scheduling algorithm.
2. Write program to implement Round Robin scheduling algorithm.
3. Write program to implement SJF scheduling algorithm.
4. Write program to implement non-preemptive priority based scheduling algorithm.
5. Write program to implement preemptive priority based scheduling algorithm.
6. Write program to implement SRJF scheduling algorithm.
7. Write program to calculate sum of n numbers using *thread* library.
8. Write a program to implement first-fit, best-fit and worst-fit allocation strategies.
9. WRITE A PROGRAM to report behaviour of Linux kernel including kernel version, CPU type and model. (CPU information)
10. WRITE A PROGRAM to report behaviour of Linux kernel including information on configured memory, amount of free and used memory. (memory information)
11. WRITE A PROGRAM to print file details including owner access permissions, file access time, where file name is given as argument.
12. WRITE A PROGRAM to copy files using system calls.

**Marks Distributions**

**Experiments – 2 X 7.5 =15**

**Record - = 05**

**Viva-Voce- =05**

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**Total=25**



## **Core – 7**

### **Internetworking**

#### **Unit - 1**

An Overview on Internet, Internet services, Internet protocols and standardization, Review of Network technologies, TCP/IP Internetworking Concepts, Architectural model, Application level interconnection, Network level interconnection, Properties of the Internet, Interconnection through IP Gateways or routers, Internet and Intranet

#### **Unit - 2**

Internet Address, Universal identifiers, Three primary classes of IP addresses, Classless IP address, Network and Broadcast addresses, Mapping internet addresses to physical addresses (ARP), ARP protocol format, Transport Gateways and subnet addressing, Multicast addressing.

Internet Protocol, Connectionless delivery system, Internet Datagram, Table driven IP routing, Bootstrap protocol (BOOTP)

#### **Unit - 3**

Routing, The origin of Gateway routing tables, Automatic route propagation, Vector distance (Bellman-Ford) routing, Gateway to Gateway Protocol (GGP), Exterior Gateway Protocol (EGP), Interior Gateway Protocol, Routing Information Protocol (RIP)

#### **Unit - 4**

Enterprise Networking, Broadband, High speed dedicated WAN services and switched WAN services, ISDN, BISDN and ATM services, Virtual private network concepts, DNS, DHCP Servers, FTP, TELNET, E-Mail, Firewall, Activities of Firewall, Configuration of firewall

#### **Books:**

1. Internetworking with TCP / IP - Douglas E .Comer, PE.
2. TCP/IP protocol suite - Forouzan Behrouz A, TMH.
3. Computer Networks – Andrew S. Tanenbaum, PHI.
4. Data and Computer Communication - William Stallings, PHI.

#### **Marks Distributions**

**Internal -----15 Marks (1Hrs.)**

**Term End Examination -----60 Marks (3 Hrs.)**

**Core – 7**

**Internetworking Lab**

1. TCP/IP Internetworking.
2. Interconnection through IP Gateways or routers.
3. IP Addressing.
4. Internet and Intranet.
5. E-Mail Firewall, Activities of Firewall and Configuration of firewall.

**Marks Distributions**

**Experiments – 2 X 7.5 =15**

**Record - = 05**

**Viva-Voce- =05**

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**Total=25**

## **SEMESTER - IV**

### **Core – 8**

#### **E-Commerce**

##### **Unit - 1**

Introduction to E-Commerce, Definition, Scope of E-Commerce, E-Commerce and Trade Cycle, Electronic Markets, Electronic Data Interchange and Internet Commerce. E-Commerce business models, B2B, B2C, C2C, Electronic Markets, Electronic Data Interchange (EDI), Technology, Standards, Communications, Implementations, Agreements, Security, EDI and Business, Inter-Organizational E-commerce.

##### **Unit - 2**

Electronic Payment system (EPS): Over view of EPS, smart card, credit card and debit card based EPS, financial instrument. Home banking, On-line banking

E-business, Internet bookshops, Software supplies and support, Electronic Newspapers, Internet Banking, Virtual Auctions, Online Share Dealing

##### **Unit - 3**

Legal issues, Paper Document vs. Electronic document, Authentication of Electronic document,

Laws, Legal issues for Internet Commerce, Copyright, Jurisdiction issues, Service provider liability,

Enforceable online contract. Security threats, transaction security Security Solutions, Symmetric and Asymmetric Cryptosystems, and Digital Signature, Protocols for secure messaging, Secure Electronic Transaction (SET) Protocol

##### **Unit - 4**

Mobile Commerce: Introduction to mobile commerce, Mobile computing applications, WAP technology, mobile information devices, client- server network

##### **Books:**

1. E-Commerce-Strategy, Technologies & Applications - David Whitley, TMH
2. E-Commerce- The cutting edge of business - Kamlesh K. Bajaj, TMH
3. E-Commerce - Ritendra Goel, New Age International

##### **Marks Distributions**

**Internal -----15 Marks (1Hrs.)**

**Term End Examination -----60 Marks (3 Hrs.)**

**Core – 8**

**E-Commerce Lab**

1. Steps to set and change computer name.
2. Steps to set and change work group name.
3. Steps to include web-site in your favourite.
4. Steps to un-hide pop-up block.
5. Steps to show default workgroup name.
6. Steps to set default gateways.
7. Steps to identify IP address.
8. Steps to set URL as home page.
9. Steps to set IP address and subnet mask.
10. Steps to view network connection.
11. Steps to change font size of web content.
12. Steps to view the coding of web page.
13. Steps to enable/disable firewall.
14. Steps to turn on and turn off automatic updates.
15. Steps to create e-mail account.
16. Steps to send e-mail.
17. Steps to add name in address book.

**Marks Distributions**

**Experiments – 2 X 7.5 =15**

**Record - = 05**

**Viva-Voce- =05**

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**Total=25**

**Core – 9**

**Software Engineering**

**Unit -1**

The Evolving Role of Software, Software Characteristics, Software Engineering Approach, Software Process Framework, Framework and Umbrella Activities, Process Models, Capability Maturity Model Integration (CMMI).

**Unit -2**

Software Requirement Analysis: Requirement Analysis and Modelling Techniques, Flow Oriented Components of SRS, Need for SRS, Software Project Management :Project Estimation, Project Scheduling, Software Risks: Risk Management, Risk Identification, Risk Projection and Risk Refinement, RMMM.

**Unit -3**

Software Quality: Software Quality Assurance, Metrics for Process and Projects, Software Design: Design Concepts, Software Architecture, Data Design at the Architectural Level and Component Level, Mapping of Data Flow into Software Architecture.

**Unit -4**

Software Testing: Strategic Approach to Software Testing, Test case generation, Validation Testing, System Testing, Black-Box Testing, White-Box Testing, Path Testing.

**Books:**

1. Fundamentals of Software Engineering - Rajiv Mall
2. Software Engineering: A Practitioner's Approach - R.S. Pressman

**Marks Distributions**

**Internal -----15 Marks (1Hrs.)**

**Term End Examination -----60 Marks (3 Hrs.)**

**Core – 9**

**Software Engineering Lab**

S. No	Practical Title
1.	<ul style="list-style-type: none"><li>• Problem Statement,</li><li>• Process Model</li></ul>
2.	Requirement Analysis: <ul style="list-style-type: none"><li>• Creating a Data Flow</li><li>• Data Dictionary, Use Cases</li></ul>
3.	Project Management: <ul style="list-style-type: none"><li>• Computing FP</li><li>• Effort</li><li>• Schedule, Risk Table, Timeline chart</li></ul>
4.	Design Engineering: <ul style="list-style-type: none"><li>• Architectural Design</li><li>• Data Design, Component Level Design</li></ul>
5.	Testing: <ul style="list-style-type: none"><li>• Basis Path Testing</li></ul>

**Marks Distributions**

**Experiments – 2 X 7.5 =15**

**Record - = 05**

**Viva-Voce- =05**

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**Total=25**

**Core – 10**

**Database Management Systems**

**Unit -1**

Concept of Database and DBMS, Characteristics of database approach, Role of DBMS, Data models

(Relational, Hierarchical, network and Object-oriented), Layered architecture of DBMS, Data independence.

**Unit -2**

Entity Relationship(ER) Modeling, Entity types, relationships, constraints. Relational data model, relational constraints, Mapping ER models to relational database, Relational algebra, SQLqueries.

**Unit -3**

Database design, Data dependencies (functional transitive, and multi-valued), Normalforms(INF, 2NF, and 3NF), Database transactions: Transaction Processing, ACID properties, concurrency control.

**Unit -4**

File Structure and Indexing, overview of File organizations (Sequential, Indexed, and Direct Access files), Indexing (Primary index, secondary index, clustering index), Concept of B and B+ trees.

**Books:**

1. Database Systems Concepts - A. Silberschatz, H. F. Korth, S. Sudarshan (McGraw Hill)
2. Fundamentals of Database Systems - Elmsari and Navathe (Addision Wesley)
3. Database Management Systems – Rajiv Chopra, S Chand

**Marks Distributions**

**Internal -----15 Marks (1Hrs.)**

**Term End Examination -----60 Marks (3 Hrs.)**

**Core – 10**

**Database Lab**

**Create tables as indicated against each question and write SQL statements to answer the given queries:**

1. Student (roll\_no, name, department, marks), Attendance (roll\_no, department, attendance)
  - a) Create the table with above schema
  - b) Display the details of the students
  - c) Display the details of the student with attendance less than 20
  - d) Find the average mark of student having attendance less than 20
  - e) Find the average mark.
  - f) Display the details of the students whose name starts with `_s'`
  - g) Display details of the student with mark greater than 70
  - h) Display the details of the students whose name starts with `_s'` or `_c'`
  - i) Find subject wise average mark
  - j) Display details of the students whose age is between 20 and 23
  
2. Course (roll\_no, subject, mark) Attendance (roll\_no, name, attendance)
  - a) Create the table with above schema
  - b) Find the Roll no. of the student securing the highest mark in a given subject
  - c) Display the roll\_no, marks of student who have taken the subject —IT||
  - d) Display the average marks of the students who have attendance less than 25
  - e) Find average mark for each subject
  - f) Find lowest marks in each subject
  - g) Find the Roll no.s of the students securing highest mark in each subject
  - h) Find the student names with highest and lowest attendance
  - i) Display the subjects taken by the students whose attendance more than 30
  - j) Display the attendance details of the students whose mark less than 200



3. Employee (Emp\_Id, Name, Address, Salary) Leave(Emp\_Id,Leave\_Taken)
- a) Create the table with above schema
  - b) Count the number of employee with salary greater than 5000
  - c) Find average salary of the employee who have taken more than 15 leaves
  - d) Find average salary of all the employees
  - e) Display the details of the employee with highest salary
  - f) Display the leave details of the employee whose name starts with 'R'
  - g) Display the details of the employee whose salary less than 3000
  - h) Count the number of employee belongs to —Education department
  - i) Display the details of the employee whose salary is between 10000 and 20000
  - j) Find average salary of the employees belong to —Revenue department

**Marks Distributions**

**Experiments – 2 X 7.5 =15**

**Record - = 05**

**Viva-Voce- =05**

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**Total=25**

**SEMESTER - V**

**Core – 11**

**Web Technology**

**Unit - 1**

Developing Static Web Pages, types and issues, tiers; WWW-Basic concepts, web client and web server, http protocol, universal resource locator (url), HTML- different tags, sections, image & pictures, listings, tables, frame, frameset, forms

**Unit - 2**

Developing Dynamic Web Pages, need for dynamic web pages; an overview of DHTML, cascading style sheet (css), comparative studies of different technologies of dynamic page creation. Active Web Pages, Need for active web pages; Java applet life cycle

**Unit - 3**

Java Script, Data types, variables, operators, conditional statements, array object, date object, string object. Java Servlet, Servlet environment and role, HTML support, Servlet API, The servlet life cycle, Cookies and Sessions.

**Unit - 4**

JSP architecture, JSP servers, JSP tags, understanding the layout in JSP, Declaring variables, methods in JSP, inserting java expression in JSP, processing request from user and generating dynamic response for the user, inserting applets and java beans into JSP, using include and forward action, comparing JSP and CGI program, comparing JSP and ASP program; Creating ODBC data source name, introduction to JDBC.

**Books:**

1. Web Technologies - Godbole A. S. & Kahate A., TMH
2. Web Technology & Design - Xavier C., New Age Publication
3. Java Server Programming, J2EE edition, WROX publishers

**Marks Distributions**

**Internal -----15 Marks (1Hrs.)**

**Term End Examination -----60 Marks (3 Hrs.)**

**Core – 11**

**Web Technology Lab**

Creation of web programme using HTML, XML , DHTML and JAVA SCRIPT.

**Marks Distributions**

**Experiments – 2 X 7.5 =15**

**Record - = 05**

**Viva-Voce- =05**

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**Total=25**

## **Core – 12**

### **Java Programming**

#### **Unit -1**

Java Architecture and Features, Difference between C++ and Java, Compiling and Executing a Java Program, Variables, Constants, Keywords, Data Types, Operators, Expressions, Executing Basic Java Programs, Conditional and looping statements.

#### **Unit -2**

Java Methods, Definition, Scope, Passing and Returning Arguments, Type Conversion and Type Checking, Built-in Java Class Methods, Using Arrays (1-D and 2-D), Java Strings: Java String class, Creating and Using String Objects, Manipulating Strings.

#### **Unit -3**

Defining and Using Classes in Java, Controlling Access to Class Members, Constructors, Method Overloading, Class Variables and Methods, Objects as parameters, final keyword.

#### **Unit -4**

Inheritance (Single Level and Multilevel), Method Overriding, Interfaces and Packages, Extending interfaces and packages, Introduction to Applets, Writing Java Applets, Event Handling in Java.

#### **Books:**

1. Programming with Java - E. Balaguruswamy, 4th Edition, McGraw Hill
2. Programming in Java - Sachin Malhotra and Saurabh Choudhury, Oxford University Press
3. Programming with JAVA - John R. Hubbard, Schaum's Series, McGraw Hill

#### **Marks Distributions**

**Internal -----15 Marks (1Hrs.)**

**Term End Examination -----60 Marks (3 Hrs.)**

**Core – 12**

**Java Programming Lab**

1. Write a Java Program to define a class called Student (Name, Roll No, Course, Marks in five papers). Find division of the student.
2. Write a Java Program to define a class, describe its constructor, overload the Constructor and instantiate its object.
3. Write a Java Program to define a class, define instance methods and overload them and use them for dynamic method invocation.
4. Write a Java Program to demonstrate use of sub class.
5. Write a Java Program to demonstrate use of nested class.
6. Write a Java Program to implement array of objects.
7. Write a Java program to practice using String class and its methods.
8. Write a Java Program to implement inheritance and demonstrate use of method overriding.
9. Write a program to demonstrate use of implementing interfaces.
10. Write a program using Applet to display a message in the Applet.

**Marks Distributions**

**Experiments – 2 X 7.5 =15**

**Record - = 05**

**Viva-Voce- =05**

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**Total=25**

## **Discipline Specific Electives**

### **DSE – 1**

#### **Computer Graphics**

##### **Unit -1**

Definition, Application, Pixel, Frame Buffer, Raster and Random Scan display, Display devices CRT, Color CRT Monitors, Scan Conversion of line- DDA algorithm of line drawing, Scan conversion of circle- Bresenham's circle generating algorithm, Polygon Filling-Scan line polygon filling algorithm.

##### **Unit -2**

2-D transformation, Translation, Rotation, Scaling, Homogeneous Coordinates, 3-D transformation, Translation, Rotation Scaling, Reflection, Shear.

##### **Unit -3**

Window to view port transformation, clipping, line clipping, Cohen –Sutherland line clipping, Polygon clipping, Sutherland and Gary Hodgman polygon clipping algorithm.

##### **Unit -4**

Hidden Surface removal—Depth comparison, Z-Buffer Algorithm, Back-Face Removal, The Painter's Algorithm, Scan-Line Algorithm, Subdivision Algorithm.

##### **Books:**

1. Computer Graphics – Donald Hearn and M. Pauline Baker (Pearson)
2. Computer Graphics - Zhigang Xiang, Roy A. Plastock (McGraw-Hill, India)
3. Computer Graphics – Er. Rajiv Chopra, (S. Chand Publication)
4. Principles of Interactive Computer Graphics – W.M. Newman, R F Sproull (McGraw Hill)

##### **Marks Distributions**

**Internal -----15 Marks (1Hrs.)**

**Term End Examination -----60 Marks (3 Hrs.)**

**DSE – 1**

**Computer Graphics Lab**

1. Write a program to implement Bresenham's line drawing algorithm.
2. Write a program to implement mid-point circle drawing algorithm.
3. Write a program to clip a line using Cohen and Sutherland line clipping algorithm.
4. Write a program to clip a polygon using Sutherland Hodgeman algorithm.
5. Write a program to fill a polygon using Scan line fill algorithm.
6. Write a program to apply various 2D transformations on a 2D object (use homogenous coordinates).
7. Write a program to apply various 3D transformations on a 3D object and then apply parallel and perspective projection on it.
8. Write a program to draw Hermite/Bezier curve.

**Marks Distributions**

**Experiments – 2 X 7.5 =15**

**Record - = 05**

**Viva-Voce- =05**

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**Total=25**

**DSE – 2**

**Artificial Intelligence**

**Unit -1**

Definition of AI, Characteristics of AI problems, AI problem solving approaches, State space search, problem reduction, search techniques, Breadth first and Depth first techniques, Heuristic search techniques, Hill climbing, Best first search.

**Unit -2**

Knowledge representation in AI, propositional logic, Semantic nets, Frames, and Scripts. Handling uncertainty in AI problems, Probabilistic reasoning, Bayesian Belief networks.

**Unit -3**

Concept of Learning, types of learning, Artificial Neural networks, ANN structures, Feed forward networks, Back propagation network, Applications of ANN.

**Unit -4**

Natural language processing, levels of knowledge used in language understanding, parsing, top-down and bottom-up parsing, transition networks

Expert systems, ES architecture, need for ES, steps for developing an expert system.

**Books:**

1. Artificial Intelligence: A Practical Approach – Rajiv Chopra, S. Chand publications
2. Introduction to Artificial Intelligence and Expert Systems – D W Patterson, PHI

**Marks Distributions**

**Internal -----15 Marks (1Hrs.)**

**Term End Examination -----60 Marks (3 Hrs.)**



**DSE – 2**

**Artificial Intelligence Lab**

1. Write a prolog program to calculate the sum of two numbers.
2. Write a prolog program to find the maximum of two numbers.
3. Write a prolog program to calculate the factorial of a given number.
4. Write a prolog program to calculate the nth Fibonacci number.
5. Write a prolog program, insert\_nth(item, n, into\_list, result) that asserts that result is the list into\_list with item inserted as the n<sup>th</sup> element into every list at all levels.
6. Write a Prolog program to remove the Nth item from a list.
7. Write a Prolog program, remove\_nth(Before, After) that asserts the After list is the Before list with the removal of every n<sup>th</sup> item from every list at all levels.
8. Write a Prolog program to implement append for two lists.
9. Write a Prolog program to implement palindrome(List).
10. Write a Prolog program to implement max(X,Y,Max) so that Max is the greater of two numbers X and Y.
11. Write a Prolog program to implement maxlist(List,Max) so that Max is the greatest number in the list of numbers List.
12. Write a Prolog program to implement sumlist(List,Sum) so that Sum is the sum of a given list of numbers List.
13. Write a Prolog program to implement two predicates evenlength(List) and oddlength(List) so that they are true if their argument is a list of even or odd length respectively.
14. Write a Prolog program to implement reverse(List,ReversedList) that reverses lists.
15. Write a Prolog program to implement maxlist(List,Max) so that Max is the greatest number in the list of numbers List using cut predicate.
16. Write a Prolog program to implement GCD of two numbers.
17. Write a prolog program that implements Semantic Networks/Frame Structures.

**Marks Distributions**

**Experiments – 2 X 7.5 =15**

**Record - = 05**

**Viva-Voce- =05**

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**Total=25**

## **SEMESTER - VI**

### **Core – 13**

#### **Programming in Visual Basic**

##### **Unit - 1**

GUI Environment: Introduction to graphical user interface (GUI), programming language (procedural, object oriented, even driven), The GUI environment, compiling, debugging and running the programs. Controls: Introduction to controls text boxes, frames, check boxes, option buttons, images, setting borders and styles, the shape control, the line control, working with multiple controls.

##### **Unit - 2**

Operations: Data types, constants, named & intrinsic, declaring variables, scope of variables, VAL function, arithmetic operations, formatting data. Decision Making: If statement, comparing strings, compound conditions (and, or, not), nested if statements, case structure, using if statements with option buttons & check boxes, displaying message in message box, testing whether input is valid or not.

##### **Unit - 3**

Modular programming: Menus, sub-procedures and sub-functions defining / creating and modifying a menu, using common dialog box, creating a new sub-procedure, passing variables to procedures, passing argument by value or by reference, writing a function/ procedure. Forms handling.

##### **Unit - 4**

Iteration handling: Do/ loops, for/ next loops, using msgbox function, using string function, Arrays and Grouped data control: Arrays-1-dimension arrays, initializing an array using for each, user-defined data types, accessing information with user-defined data types, using list boxes with array, Database connectivity.

##### **Books:**

1. Programming in Visual Basic 6.0 – Julia Case Bradley, Anita C. Millispangh, TMH

##### **Marks Distributions**

**Internal -----15 Marks (1Hrs.)**

**Term End Examination -----60 Marks (3 Hrs.)**

**Core – 13**

**Visual Basic Lab**

1. To implement a Visual Basic program to calculate the simple interest and compound interest.
2. To implement a Visual Basic program to generate Fibonacci series.
3. To implement a Visual Basic program to create a scientific calculator using control arrays.
4. To implement a Visual Basic program to perform string operations based on the user choice.
5. To implement a Visual Basic program to perform matrix operations.
6. To implement a Visual Basic program to prepare salary calculation of employees.
7. To create a Visual Basic application with MDI features and text editing capabilities.
8. To create a Visual Basic application to compute discounts for different product and print the net price.
9. To implement a Visual Basic program to design a calendar.
10. To implement a Visual Basic program to create a student mark sheet.

**Marks Distributions**

**Experiments – 2 X 7.5 =15**

**Record - = 05**

**Viva-Voce- =05**

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**Total=25**

**Core – 14**

**Data Warehousing and Data Mining**

**Unit -1**

Concept of a Data warehouse, features of data warehousing: subject oriented, integrated, time variant, and non-volatile, multi-dimensional data model, data cubes, OLAP operations: roll-up, drill-down, slice and dice, Architecture of data warehouse.

**Unit -2**

Concept of Data mining, data mining techniques, process of knowledge discovery in databases, mining frequent patterns, market basket analysis, Association rule mining, Interestingness measures.

**Unit -3**

Classification and prediction, classification techniques, decision tree, rule-based classification, k-Nearest neighbor classifier, Bayesian classification, linear regression.

**Unit -4**

Cluster analysis, clustering techniques, k-Means and k-Medoids methods, Introduction to Hierarchical and Density-Based methods, Outliers. Applications of data mining in finance, business, social networks, and web mining

**Books:**

1. Data Mining: Concepts and Techniques - J Han and M Kamber, Elsevier
2. Data Mining Techniques - Arun K Pujari, University Press

**Marks Distributions**

**Internal -----15 Marks (1Hrs.)**

**Term End Examination -----60 Marks (3 Hrs.)**

**Core – 14**

**Data Warehousing and Data Mining Lab**

1. Build Data Warehouse and Explore WEKA.
2. Perform data pre-processing tasks and Demonstrate performing association rule mining on data sets.
3. Demonstrate performing classification on data sets.
4. Demonstrate performing clustering on data sets.
5. Demonstrate performing Regression on data sets.

**Marks Distributions**

**Experiments – 2 X 7.5 =15**

**Record - = 05**

**Viva-Voce- =05**

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**Total=25**

## **Discipline Specific Electives**

### **DSE – 3**

#### **Cloud Computing**

##### **Unit -1**

Recent trends in Computing: Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing, Cloud service providers, Benefits and limitations of Cloud Computing

##### **Unit -2**

Cloud Computing Architecture, Comparison with traditional computing architecture (client/server), Services provided at various levels, Service Models- Infrastructure as a Service(IaaS), Platform as a Service(PaaS), Software as a Service(SaaS), How Cloud Computing Works, Deployment Models-Public cloud, Private cloud, Hybrid cloud, Community cloud.

##### **Unit -3**

Service Management in Cloud Computing, Service Level Agreements(SLAs), Billing & Accounting, Comparing Scaling Hardware: Traditional vs. Cloud, Economics of scaling. Examples of cloud systems like Google App Engine, Microsoft Azure, AmazonEC2.

##### **Unit -4**

Cloud Security, Infrastructure Security, Network level security, Host level security, Application level security, Data security and Storage- Data privacy and security Issues, Jurisdictional issues raised by Data location, Authentication in cloud computing

##### **Books:**

1. Cloud Computing – U S Pandey and K Choudhary, S Chand
2. Cloud Computing: Principles and Paradigms - Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wiley

##### **Marks Distributions**

**Internal -----15 Marks (1Hrs.)**

**Term End Examination -----60 Marks (3 Hrs.)**

**DSE – 3**

**Cloud Computing Lab**

1. Create virtual machines that access different programs on same platform.
2. Create virtual machines that access different programs on different platforms .
3. Working on tools used in cloud computing online-
  - a) Storage
  - b) Sharing of data
  - c) manage your calendar, to-do lists,
  - d) a document editing tool
4. Exploring Google cloud
5. Exploring microsoft cloud
6. Exploring amazon cloud

**Marks Distributions**

**Experiments – 2 X 7.5 =15**

**Record - = 05**

**Viva-Voce- =05**

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**Total=25**

**Discipline Specific Electives**

**DSE-4**

**Android Programming**

**UNIT-I**

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.

**UNIT-II**

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.

**UNIT-III**

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

**UNIT-IV**

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

**Text Book:**

Android application Development for Java Programmers: James C. Sheusi. Cengage Learning,

2013.

**Marks Distributions**

**Internal -----15 Marks (1Hrs.)**

**Term End Examination -----60 Marks (3 Hrs.)**



**DSE-4**

**Android Programming Lab**

**Practical exercises based on concepts listed in theory.**

**Marks Distributions**

**Experiments – 2 X 7.5 =15**

**Record - = 05**

**Viva-Voce- =05**

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**Total=25**

**DSE – 4**

**Software Development Project Work**

A student has to undertake a software development project work under the guidance of a teacher during the 6<sup>th</sup> semester. After completion of the project, the student has to submit a project report which will be evaluated by an External Examiner and Internal Examiner.

**Marks Distributions**

**Project Report = 80**

**Viva-Voce- =20**

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**Total=100**