



Mahatma Gandhi University, Priyadarshini Hills  
Kottayam

Bachelor's Degree Programme in Computer Science

*Prepared By*

**Board of Studies in Computer Applications**

**And**

**Faculty of Science and Technology**

**May 2017**

## **Acknowledgement**

There are many profound personalities whose relentless support and guidance made this syllabus restructuring 2017 a success. I take this opportunity to express my sincere appreciation to all those who were part of this endeavor for restructuring of the syllabus and curriculum of Under Graduate Programme in Computer Applications and Science under Mahatma Gandhi University, Kottayam.

I express profound gratitude to the Honorable Vice-Chancellor, Pro-Vice chancellor, Registrar, Members of the syndicate and Academic Council for their leadership and guidance for completion of this work. I place on record my whole hearted gratitude to the members of Faculty of Science and Technology and Board of Studies (UG) in computer Applications for their untiring efforts. I also appreciate the efforts of members of University Academic section and other staff.

I am also grateful to all faculty members of various colleges who participated in the workshops organized by the University for restructuring the syllabus and curriculum. I also place on record my gratitude to all professionals, academicians and other stakeholders who gave valuable suggestions in this regard.

Dean, Faculty of Science and Technology,  
Mahatma Gandhi University,  
Kottayam.

## **1. Introduction**

Mahatma Gandhi University introduced choice based credit and semester and grading system in colleges affiliated to University from the academic year 2009-2010 under direct grading system. Regulations for undergraduate programmes under choice based course-credit-semester system and grading was introduced in the university from the academic year 2013-2014 onwards under indirect grading system. The university Grants Commission, in order to facilitate student mobility across institutions within and across countries and also to enable potential employers to assess the performance of students, insisted to introduce uniform grading system in universities. The academic council of M G University resolved to introduce the UGC guidelines for choice based credit semester system from the academic year 2016-17 onwards . Meanwhile the Hon'ble Supreme Court of India has issued orders to include core courses on Environmental Studies and Human Rights in the Syllabi and curricula of all U G programmes of all Universities all over India. In continuation to this the U.G.C has issued circular regarding the implementation of the above said changes by accepting the direction of the Honorable Supreme Court as a national policy. Hence, the syndicate of M G University has decided to modify the syllabi and curricula of all UG programmes in accordance with the directions of the Honourable Supreme Court and U.G.C. Further, the syndicate has decided to implement the new regulations and syllabi with effect from the academic year 2017-18. In view of this, the Board of Studies of Computer Applications and the Faculty of Science and Technology has prepared the following syllabus for U G programmes in Computer applications and Science.

## **2. Scope**

The revised syllabus for Computer Application and Science provides a strong foundation to pursue post graduation programme in computer science / applications. The knowledge acquired by the students may also equip them to meet the industrial need, and get placed.

## **3. Programme Objective**

The Programme in Computer Application and Science is designed with the following specific objectives.

- (a) To attract young minds to the potentially rich & employable field of computer applications.

- (b) To be a foundation graduate programme which will act as a feeder course for higher studies in the area of Computer Science/Applications.
- (c) To develop skills in software development so as to enable the graduates to take up self-employment in Indian & global software market.
- (d) To Train & Equip the students to meet the requirement of the Industrial standards.

#### **4. Course Design**

The UG programme in Computer Applications and Science includes Common courses, Core courses, Complementary courses, Open courses, Seminar, Project and viva voce. No course shall carry more than four credits. The student shall select any one open course in semester V offered by various departments of the College.

#### **5. Duration of Course**

The programme shall normally extend over a period of three academic years consisting of six semesters.

## Consolidated Scheme for I to VI Semesters – B.Sc. Computer Science

Sem	Course Code & Title	Course Category	Hours per Week		Credits	Marks		
			Theory	Lab		Internal	External	Total
I	English-I	Common	5		4	20	80	100
	Mathematics-I	Complementary	4		4	20	80	100
	CS1CRT01 Computer Fundamentals and Basics of PC Hardware	Complementary	4		4	20	80	100
	CS1CRT02 Methodology of Programming and C Language	Core	4		3	20	80	100
	CS1CMT01 Fundamentals of Digital Systems	Complementary	4		4	20	80	100
	CS1CRP01 Software Lab-I	Core		4	2	20	80	100
II	English-II	Common	5		4	20	80	100
	Mathematics-II	Complementary	4		4	20	80	100
	CS2CRT03 Data Communication	Complementary	4		3	20	80	100
	CS2CRT04 Computer Organization and Architecture	Core	4		4	20	80	100
	CS2CRT05 Object Oriented Programming using C++	Core	4		3	20	80	100
	CS2CCP02 Software Lab-II	Core		4	2	20	80	100
III	Probability and Statistics	Complementary	4		4	20	80	100
	CS3CRT06 Database Management Systems	Core	4		4	20	80	100
	CS3CRT07 System Analysis and Design	Core	4		4	20	80	100
	CS3CRT08 Networking Fundamentals	Complementary	4		4	20	80	100
	CS3CRT09 Data Structure using C++	Core	4		3	20	80	100
	CS3CRP03 Software Lab-III	Core		5	2	20	80	100
IV	CS4CRT10 LINUX Administration	Core	4		4	20	80	100
	CS4CRT11 Microprocessor and Assembly Language Programming	Complementary	4		4	20	80	100
	CS4CRT12 Computer Aided Optimization Techniques	Core	4		4	20	80	100
	CS4CRT13 Web Programming Techniques	Core	4		4	20	80	100

	CS4CRP04 Assembly Language Programming Lab	Complementary		5	2	20	80	100
	CS4CRP05 Software Lab IV	Core		4	2	20	80	100
V	CS5CRT14 System Software and Operating System	Core	4		4	20	80	100
	CS5CRT15 IT and Environment	Core	4		4	20	80	100
	CS5CRT16 Java Programming using Linux	Core	4		3	20	80	100
	CS5CRT17 Computer Security	Core	4		3	20	80	100
	CS5OPT Open Course	Core	4		4	20	80	100
	CS5PRP06 Software Development Lab I (Mini Project )	Core		5	2	20	80	100
VI	CS6CRT18 Computer Graphics	Core	5		4	20	80	100
	CS6CRT19 Big Data :Analytics	Core	5		4	20	80	100
	CS6PET Programme Elective	Core	5		4	20	80	100
	CS6SMP07 Seminar	Core		3	2	100	0	100
	CS6PRP08 Software Development Lab II ( Main Project)	Core		7	3	20	80	100
	CS6VVP Viva Voce	Core		0	1	0	100	100
<b>Grand Total</b>			<b>113</b>	<b>37</b>	<b>120</b>	<b>780</b>	<b>2820</b>	<b>3600</b>

Open Course(OP): CA5OPT01 : Informatics and Cyber Ethics, CA5OPT02 : Computer Fundamentals, Internet & MS Office.

## **SYLLABUS- B.Sc. Computer Science**

### **SEMESTER I**

#### **CS1CRT01 : Computer Fundamentals and Basics of PC Hardware (Complementary)**

Theory: 4 hrs. per week

Credits : 4

##### **Unit I:**

Introduction to Computers: Generations of Computer (I-V), Classification of Computers: Analog, Digital and Hybrid Computers, Micro, Mini, Mainframe, Super Computers, Servers, Laptop and Block Diagram of a Computer, Functions of the Different Units: Input unit, Output unit, Memory unit, CPU (ALU+CU). Booting Process- POST, BIOS, clock speed, memory speed, memory capacity.

##### **Unit II:**

Introduction to Computer Hardware, DC regulated power supply- Block Diagram, Concepts of Switch Mode Power supply, Inverters, UPS and their applications. Basic Components of CPU, Mother Board.

##### **Unit III:**

Expansion Slots- ISA, EISA, MCA, VESA, PCI local bus, Processor, Connectors, CMOS memory, SMPS, Serial and Parallel Ports, USB, BIOS chip, Steps for assembling a PC.

##### **Unit IV:**

Input Devices: Keyboard, Point and draw devices: mouse, joystick, track ball, light pen, Data Scanning devices: image scanner, OCR, OMR, MICR, Bar code reader, Voice Recognition Device: Microphone, Output Devices: Monitor- CRT displays, Non-CRT displays, TFT: LED, LCD, Plasma. Printer, Impact and non-impact, Character, line and Page Printers.

##### **Unit V:**

Memory: Primary Memory, RAM- SRAM, DRAM, ROM, PROM, EPROM, EEPROM, flash memory, Secondary memory: Hard Disk: Structure of a hard disk, how data is stored in a hard disk, concept of tracks, sectors, clusters, cylinders, CD-R, RW, DVD-RW, Blue-ray disk, HVD, PC memory Units: SIMM, DIMM, RIMM.

***Book of study:***

1. Pradeep Sinha and Priti Sinha - Computer Fundamentals, Fourth Edition- 2007, BPB Publications
2. B. RAM, “Computer Fundamentals: Architecture and Organization”, New age international (P) Limited.

***Reference:***

1. Balagurusamy - Fundamentals of Computer, First Edition- 2009, McGraw-Hill
2. Anita Goel - Computer Fundamentals, First Edition-2010, Pearson.
3. Peter Norton, “Introduction to Computers”, McGraw Hill

**CS1CRT02 : Methodology Of Programming And C Language (Core)**

Theory: 4 hrs. per week

Credits: 3

**UNIT 1**

Introduction to programming, Classification of computer languages, Language translators (Assembler, Compiler, Interpreter), Linker, Characteristics of a good programming language, Factors for selecting a language, Subprogram, Purpose of program planning, Algorithm, Flowchart, Pseudocode, Control structures (sequence, selection, Iteration), Testing and debugging

**UNIT 2**

C Character Set, Delimiters, Types of Tokens, C Keywords, Identifiers, Constants, Variables, Rules for defining variables, Data types, C data types, Declaring and initialization of variables, Type modifiers, Type conversion, Operators and Expressions- Properties of operators, Priority of operators, Comma and conditional operator, Arithmetic operators, Relational operators, Assignment operators and expressions, Logical Operators, Bitwise operators

**UNIT 3**

Input and Output in C – Formatted functions, unformatted functions, commonly used library functions, Decision Statements If, if-else, nested if-else, if-else-if ladder, break, continue, goto, switch, nested switch, switch case and nested if. Loop control- for loops, nested for loops, while loops, do while loop.



## **UNIT 4**

Array, initialization, array terminology, characteristics of an array, one dimensional array and operations, two dimensional arrays and operations. Strings and standard functions, Pointers, Features of Pointer, Pointer and address, Pointer declaration, void wild constant pointers, Arithmetic operations with pointers, pointer and arrays, pointers and two dimensional arrays.

## **UNIT 5**

Basics of a function, function definition, return statement, Types of functions, call by value and reference. Recursion -Types of recursion, Rules for recursive function, direct and indirect recursion, recursion vs iterations, Advantages and disadvantages of recursion. Storage class, Structure and union, Features of structures, Declaration and initialization of structures, array of structures, Pointer to structure, structure and functions, typedef, bitfields , enumerated data types, Union, Dynamic memory allocation, memory models, memory allocation functions.

### ***Book Of Study:***

1. Ashok Kamthane - Programming in C, Third Edition, Pearson Education
2. P K Sinha & Priti Sinha - Computer Fundamentals , Fourth Edition, BPB Publications.

### ***Reference :***

1. E. Balaguruswamy -Programming in ANSI C ,Seventh Edition , McGraw Hill Education
2. Byron Gotfried - Programming with C, Second Edition, Schaums Outline series. McGraw Hill

## **CS1CMT01 : Fundamentals of Digital Systems (Complementary)**

Theory: 4 hrs. per week

Credits: 4

### **Unit I: Number Systems, Operations and Codes**

Decimal Numbers, Binary Numbers, Decimal to Binary Conversion, Binary Arithmetic,

1's and 2's complement of binary numbers, Signed numbers, Arithmetic operations with signed numbers, Hexadecimal numbers, Binary to hexadecimal conversion, Hexadecimal to binary conversion, Hexadecimal to decimal conversion, Decimal to Hexadecimal conversion, Hexadecimal addition and subtraction, Octal numbers, Octal to decimal conversion, Decimal to Octal conversion, Octal to binary conversion, Binary to Octal conversion, Binary coded decimal, 8421 BCD code, BCD addition, Digital codes- gray code, binary to gray code conversion, Alphanumeric codes, parity codes.

### **Unit II: Logic Gates, Logic Levels and Waveforms**

Logic Levels and Digital waveforms, Logic Gates: AND, OR, NOT, XOR, XNOR, NAND (Definition, Symbols, Truth Tables and Operation). Universal Property of NAND and NOR gates. Logic gate operations with pulse waveforms.

**Unit III: Boolean Algebra and Logic Simplifications.** Boolean operations and expressions, Laws and rules of Boolean algebra, De-morgans theorems, Boolean analysis of logic circuits, simplification using Boolean algebra, standard forms of Boolean expression, Boolean expressions and truth tables. The Karnaugh Map, Karnaugh SOP minimization, Karnaugh POS minimization, Five variable Karnaugh maps.

### **Unit IV: Combinational Logic and its functions.**

Basic combinational Logic circuits, Implementing combinational logic, combinational logic using NAND and NOR gates, Basic overview of logic functions, Basic adders, parallel binary adders, comparators, decoders, encoders, code converters, multiplexers, demultiplexers, parity generators/ checkers.

### **Unit V: Sequential Circuits.**

Latches, RS flip flop using NAND/ NOR gates, Clocked RS, D, JK and T flip flops, Edge triggered flip flops, Master slave flip flops, Asynchronous counter operation, Synchronous counter operations, Up/ Down Synchronous counter, Design of synchronous counters. Basic shift register functions. Serial in-Parallel out shift registers, Parallel in -Serial out shift registers, Serial in- Serial out shift registers, Parallel in Parallel out shift registers.

***Book of Study:***

1. Floyd and Jain- Digital Fundamentals, Eighth Edition, Pearson Education

***Reference:***

1.A P Malvino and D P Leach - Digital Principles and Applications, Fourth edition, Tata McGraw Hill Publishers, co Ltd.

**CS1CRP01 : Software Lab - I**

Software Lab: 4 hrs. per week

Credits:2

**Syllabus**

1. Programs to familiarize printf() and scanf() functions.
2. Programs Based on Decision statements , break, goto, continue, switch and Loop controls statements.
3. Programs Based on One dimensional and two dimensional arrays.
4. Programs on Strings and string handling functions.
5. Programs based on Pointers, operations on pointers, Arrays & Pointers,
6. Programs based on functions, Call by value, Call by reference, Recursion,
7. Programs based on structure and union, array of structures, Pointer to structure, structure and functions
8. Simple programs using pointers and malloc().

**Scheme of Evaluation for software lab I external is as follows:**

**Division of Marks (Practical - 3 hours External)**

First program from part 1& 2	<b>- 25 marks</b>
1.Flowchart	- 5 marks
2.Logic	- 10 marks

3.Successful compilation – 5 marks

4.Result – 5 marks

Second program should be based on advanced concepts ,part 3 to part 8 - **35 marks**

1.Logic – 20 marks

2.Successful compilation – 10 marks

3. Result – 5 marks)

Viva Voce - **10 marks**

Lab Record (minimum of 25 Programs) - **10 marks**

**Total Marks - 80 marks**

## **B.Sc. Computer Science - SEMESTER II**

### **CS2CRT03 : Data Communication(Complementary)**

Theory: 4 hrs. per week

Credits: 3

#### **Unit I: Data and Signals**

Analog and Digital Data, Analog and Digital Signals, Periodic and Nonperiodic, Periodic Analog signals, Time and Frequency Domains, Composite Signals, Bandwidth, Digital Signals, Bit Rate, Digital Signal as a Composite Analog Signal, Transmission of Digital and Analog Signals, Transmission Impairment, Attenuation, Distortion, Noise, Data rate limits, Noiseless channel: Nyquist bit rate, Noisy Channel: Shannon Capacity, Simplified Communication & Data Communication models. Data Flow-Simplex, Half Duplex, Full Duplex.

#### **Unit II : Transmission Media**

Guided media, Twisted-pair cable – UTP, STP, Connectors Coaxial Cable, Connectors Fiber-Optic Cable Propagation Modes, Unguided Media - Wireless Transmission - Terrestrial

Microwave, Satellite Microwave, Radio Waves. Infrared.

#### **Unit III: Digital Transmission**

Analog to Digital Conversion : Block Diagram of Digital Communication System. Parallel and serial ports Pulse Code Modulation(PCM), Sampling, Sampling Rate, Quantization, Delta modulation, Adaptive Delta Modulation, Transmission modes, Parallel Transmission, Serial Transmission, Asynchronous Transmission, Synchronous Transmission.

#### **Unit IV: Analog Transmission**

Digital to Analog Conversation, Modulation of Digital Data, Bit Rate, Baud Rate, Carrier signal, ASK, FSK, PSK, QAM. Analog to Analog modulation, Amplitude Modulation, Frequency Modulation, and Phase Modulation. Bandwidth Utilization : Multiplexing and Spectrum Spreading : Multiplexing, FDM, WDM, TDM, Synchronous TDM, Digital Signal Services, Statistical TDM, Spread Spectrum, FHSS, DSSS.

#### **Unit V: Switching**

Circuit-Switched Networks, Three Phases, Packet Switching, Datagram Networks, Virtual-Circuit networks, Three Phases, Connection Oriented and Connectionless Services.

Telephone Network :Major Components, Local Loops, Trunks, Switching Offices, Dial-Up service, Digital Subscriber Line, Cable Networks, Traditional Cable Networks, HFC Network, Cable TV for data transfer.

***Book of Study:***

1. Behrouz A.Forouzan - Data Communications and Networking, Fifth Edition, TATA McGraw Hill Education.

***References:***

1. William Stallings- Data and Computer communications,Eighth Edition, Pearson.
2. Willaim L.Sechwebar- Data Communications, First Edition, Tata McGraw Hill Publishing Co Ltd .

**CS2CRT04: Computer Organization and Architecture (Core)**

Theory: 4 hrs. per week

Credits: 4

**Unit 1:Basic computer organization and design:**

Operational concepts, Instruction codes, Computer Registers, Computer Instructions, Memory locations and addresses, Instruction cycle, Timing and control, Bus organization.

**Unit 2: Central Processing Unit:**

General Register Organization, Stack Organization, Addressing modes, Instruction Classification, Program control.

**Unit 3: Memory Organization:**

Memory Hierarchy, Main Memory, Organization of RAM, SRAM, DRAM, Read Only Memory-ROM-PROM,EROM,EEPROM, Auxiliary memory, Cache memory, Virtual Memory, Memory mapping Techniques.

#### **Unit 4: Parallel Computer Structures:**

Introduction to parallel processing, Pipeline computers, Multi processing systems, Architectural classification scheme-SISD, SIMD, MISD, MIMD.

**Unit 5: Pipelining and Vector processing:** Introduction to pipelining, Instruction and Arithmetic pipelines (design) Vector processing, Array Processors.

#### ***Book of study :***

- 1.M.Morris Mano-Computer Systems Architecture, Third Edition, Pearson Education
- 2.Kai Hwang and F A Briggs-Computer Architecture and parallel processing, McGraw Hills,1990

#### ***Reference***

1. Carl Hamacher -Computer Organization, Fifth Edition, Tata McGraw Hill.
2. John P Hayes -Computer Architecture & Organization–Mc Graw Hill
3. William Stallings-Computer Organization and Architecture , Seventh Edition, Pearson Education

### **CS2CRT05 : Object Oriented Programming using C++**

Theory: 4 hrs. per week

Credits: 3

#### **Unit I:Principles of Object Oriented Programming, Beginning with C++**

Procedure Oriented Programming-Object Oriented Programming-Basic concepts of object-oriented programming- Benefits of OOP- Applications of OOP-A simple C++program-Structure of C++ program-C++ data types- Symbolic constants- Reference by variables-Operators in C++- Operator precedence- Control structures- Function in C++ - The main function, Function prototyping- Call by reference- Return by reference- Inline function- Default arguments- Function overloading.

#### **Unit II: Classes and Objects**

Specifying a class- Defining member functions- Nesting of member functions -Private member functions - Arrays within a class - Memory allocation for objects-Static data members -Static member functions - Arrays of objects - objects as function arguments -Friendly functions- Returning Objects.

### **Unit III: Constructors and Destructors, Overloading**

Constructors- Default constructor-Parameterized constructor-Copy constructor- Multiple constructors- Constructors with default arguments- Dynamic constructor-Destructors- Operator overloading- Unary and Binary operator overloading- Overloading using friends- Rules for overloading- Type conversion.

### **Unit IV: Inheritance**

Inheritance- Defining derived classes-Visibility modes-Single, Multilevel, Multiple, Hierarchical and Hybrid inheritance- Virtual base classes- Abstract classes- Constructors in derived classes- Nesting of classes.

### **Unit V: Pointers, Virtual Functions and Polymorphism, Working with Files**

Pointers- Pointers to objects- this pointer-Pointers to derived classes- Virtual functions- Pure virtual functions- File Stream classes, Opening and closing a file- File opening modes- File pointers and their manipulations- Sequential input and output operations.

#### ***Book of Study:***

1.E. Balagurusamy - Object Oriented Programming with C++, Fifth edition, Tata McGraw Education Hill , 2011.

#### ***Reference:***

- 1.Ashok N. Kamthane, Object oriented Programming with ANSI & Turbo C++, First Edition, Pearson India
- 2.Robert Lafore, Object Oriented Programming in Turbo C++, First Edition, Galgotia Publications.
- 3.D Ravichandran, Programming with C++, Second edition, Tata McGraw- Hill.

### **CS2CRP02 : Software Lab - II**

1. Programs based on default arguments, function overloading.
2. Programs based on array of objects, friend functions, passing objects as arguments to function.
3. Programs based on operator overloading (binary, unary) using member functions and friend functions.
4. Programs based on constructors, different types of constructors.
5. Programs based on inheritance, different types of inheritance.



## B.Sc.Computer Science- SEMESTER III

### CS3CRT06 : Database Management Systems (Core)

#### Unit I: Introduction

Characteristics of the Database Approach – Database users :DBA , Database Designers ,End users – Advantages of using the DBMS Approach – Data models, Schemas , and Instances – Three-Schema Architecture and Data Independence.

DBMS Languages: DDL, DML – The Database System Environment: DBMS Component Modules.

#### Unit II: Relational Model

**Entity Relationship Modeling:** Introduction –Entity Types , Entity Sets , Attributes and Keys – Relationship Types ,Relationship Sets, Roles , and Structural Constraints – Weak Entity Types – Notation for ER diagrams – Sample ER diagrams.

**Relational Model concepts:** Domains ,Attributes , Tuples , and Relations – Characteristics of Relations – Relational Model Constraints and Relational Database Schemas : Domain Constraints, Key Constraints , Relational Database Schemas , Entity Integrity , Referential Integrity, and Foreign Keys .

#### Unit III: SQL

Data Types – Data Definition commands : CREATE , ALTER ,DROP - Adding constraints in SQL – Basic SQL Queries : INSERT ,SELECT ,DELETE ,UPDATE - Substring comparison using LIKE operator ,BETWEEN operator – Ordering of rows – SQL set operations :UNION , EXCEPT , INTERSECT – Complex Queries : Comparison involving NULL and Three-valued logic ,Nested queries , EXISTS and UNIQUE functions, Renaming of attributes and Joining of tables, Aggregate functions ,Grouping – Managing Views.

#### Unit: Normalization and Indexing Structures for Files

**Normalization:** Informal Design Guidelines for Relational Schemas –Functional Dependencies – Normal forms : First Normal Form , Second Normal Form , Third Normal Form – General Definitions of Second and Third Normal Forms –Boyce-Codd Normal Form.

**Indexing Structures for files:** -Types of Single-Level Ordered Indexes: Primary Indexes, Clustering Indexes, and Secondary Indexes.

## **Unit V: Transaction Processing and Database Security**

**Transaction Processing:** Introduction to Transaction Processing - Transaction and System Concepts – Desirable properties of Transactions.

**Database Security and Authorization:** Types of Security – Control measures – Database Security and DBA – Access Control , User Accounts, and Database Audits –Access Control based on Granting and Revoking Privileges.

### ***Books of study:***

1.Ramez Elmasri and Shamkant B.Bavathe - DATABASE SYSTEMS , Sixth Edition, Pearson Education.

### ***References:***

1. C.J Date- An Introduction to Database Systems, Eighth edition, Pearson Education,2003
2. Reghu Ramakrishnan and Johannes Gehrke- Database Management Systems , Third edition, Mc Graw Hill International Edition.
3. Dipin Desai , An Introduction to Database Systems , First Edition, Galgoria Publications .

## **CS3CRT07 : System Analysis And Design**

### **Unit1**

Information systems concepts, Business information systems; Describing the business organization – organization chart , organization function list ; information system levels - operational, lower, middle, top management; the system development life cycle concepts;hardware and software end products. Life cycle activities- life cycle flow chart, task,

management review, baseline specifications, role of system analyst.

### **Unit II**

Basic tool of system analysis: identification codes – definition, need for codes, code plan, code dictionary, common type of codes, forms design – basic parts of form, style and types of form, principles of form design .Tools for structure analysis and design: Types of basic charts, decision tables, decision trees,

structured English, data flow diagram, data dictionary, system flow charts, flow charting symbols, information oriented flow charts, process oriented flow charts, HIPO charts.

### **Unit III**

Study phase: Study phase activities, information service request, initial investigation, fact finding techniques, fact analysis techniques, steps in feasibility analysis, study phase report.

### **Unit IV**

Design phase: Design phase activities, structure design, input design- input data, input media and devices, output design, design phase report.

### **Unit V**

Development phase: Development phase activities, bottom up and top down computer program development, training- programmer, operator, user trainings ; conversion; change over plan; steps in computer program development; structured programming; development phase report.

### **Unit VI**

Operation phase: Operation phase activities; change over crisis; change over activities; routine operations; security; performance evaluation.

### ***Book of study :***

1. Marvin Gore & John Stubbe- Elements Of System Analysis, Galgotia Book Source.

### ***References:***

1. Elias M Awad - System Analysis And Design , Second Edition, Galgotia Publications.
2. Richard Fairley - Software Engineering Concepts , Tata McGraw Publication, 2001.

## **CS3CRT08 : Networking Fundamentals (Complementary)**

### **Unit I**

Network: Definition-Models-LAN, WAN, MAN, Network Criteria, Type of connections-point-to-point, multipoint. Topology-Categories-Mesh, Star, Bus, Ring. Internet-History, service providers. Protocol and standards

Connecting Devices: Hubs, Repeaters, Bridges, Switches, Gateways. Connecting remote LANS

### **Unit II**

Reference Models : OSI Reference model, TCP/IP Reference model, Addressing. Data Link Layer: Error Detection and Correction, Block Coding-Linear Block Codes, Cyclic Codes, Cyclic Redundancy Check-Advantages, Checksum-One's Complement

### **Unit III**

Framing- Flow Control, Error Control, Noisy and Noiseless Channels. Network Layer: Logical Addressing, IPV4 Address-Address Space Notation, Network Address Translation.IPV6 address-structure, address space, advantages, tunnelling, Address mapping.

### **Unit IV**

Routing and Forwarding: Forwarding techniques, Routing table, Distance vector routing, multicast routing, and routing protocols. User Datagram Protocol-ports, user datagram, uses, TCP-features, segment, connection.

### **Unit V**

Congestion Control- Open loop and Closed loop, Quality of Service. Application Layer -Domain Name Space, Distribution, TELNET, FTP, SMTP, URL, Cookies, HTTP-Definition, Proxy Sever

### ***Book of study:***

1. Behrouz A Forouzan - Data communication and Networking , Fourth Edition, McGraw Hill

### ***References:***

1. Andrew S Tanenbaum - Computer Networks, Fourth Edition, Prentice Hall.
2. .William Stallings- Data and Computer Communications , Eighth Edition, Prentice Hall
3. Fred Halsall, Lingana Gauda Kulkarni - Computer Networking & Internet, Fifth Edition, Addison-Wesley .

## **CS3CRT09 Data Structures using C++ (Core)**

### **Unit I**

Concept of Structured data - Data structure definition, Different types and classification of data structures, Arrays – Memory allocation and implementation of arrays in memory, array operations, Applications - sparse matrix representation and operations, polynomials representation and addition, Concept of search and sort – linear search, binary search, selection sort, insertion sort, quick sort.

### **Unit II**

Stacks – Concepts, organization and operations on stacks using arrays (static), examples, Applications - Conversion of infix to postfix and infix to prefix, postfix evaluation, subprogram calls and execution, Multiple stacks representation.

Queues - Concepts, organization and operations on queues, examples.

Circular queue – limitations of linear queue, organization and operations on circular queue. Double ended queue, Priority queue.

### **Unit III**

Linked list: Concept of dynamic data structures, linked list, types of linked list, linked list using pointers, insertion and deletion examples, circular linked list, doubly linked lists

Applications- linked stacks and queues, memory management basic concepts, garbage collection.

### **Unit IV**

Trees - Concept of recursion, trees, tree terminology, binary trees, representation of binary trees, strictly binary trees, complete binary tree, extended binary trees, creation and operations on binary tree, binary search trees, Creation of binary search tree, tree traversing methods – examples, binary tree representation of expressions.

### **Unit V**

File - Definition, Operations on file (sequential), File organizations - sequential, Indexed sequential, random files, linked organization, inverted files, cellular partitioning, hashing – hash tables, hashing functions, collisions, collision resolving methods.

***Books of study :***

- 1.G.S Baluja - Data Structures Through C++ (A Practical Approach), Second Edition-2004, Danapat Rai & Co.
2. Ellis Horowitz and Sartaj Sahni - Fundamentals of Data Structures in C++ , Second Edition, Galgotia Publications.

***References:***

- 1.Seymour Lipschutz, Theory and Problems of Data Structures, Schaums Outline Series,2006, McGraw Hill
- 2.Yedidyah Lanngsam, Moshe Augustein, Aaron M Tenenbaum- Data structures using C and C++ , Second Edition, Prentice Hall

**CS3CRP03 : Software Lab – III**

**(There will be two questions; the first from DBMS and second from Data structures.)**

**I. SQL Commands (2 hrs. per week)**

1. Data definition commands - CREATE, ALTER, DROP, Adding Constraints Primary key, foreign key, unique key, check, not null.
2. Basic SQL queries INSERT, SELECT, DELETE, UPDATE, Using multiple tables, ordering of rows using ORDER BY option, Set operations using UNION, EXCEPT, INTERSECT, Substring Comparison using LIKE operator, BETWEEN operator.
3. Complex Queries Nested Queries, EXISTS and UNIQUE/DISTINCT functions, NULL values, Renaming of attributes and Joining of tables, Aggregate functions and grouping.
4. Managing views, Simple stored procedures.
5. Data Control commands - Access Control and Privilege commands

## **II. Data Structures using C++. (3 hours per week)**

### **Section I**

Array – Insertion , Deletion, Polynomial addition using arrays

Sort – Selection, Insertion, Quick

Search – Linear search, Binary search

Sparse matrix – Sparse form representation, transpose and addition using the sparse form

### **Section II**

Stack - Implementation using arrays ( linear stack)

Queue – Implementation using arrays ( linear queue)

### **Section III**

Singly linked list – Implementation using dynamic memory allocation techniques, arrange the list based on the ascending or descending order of the information field, concatenate two linked lists, interchange any two nodes in a list.

### **Section IV**

Creation of binary search trees, Insertion and deletion of nodes.

## B.Sc.Computer Science- SEMESTER IV

### CS4CRT10: Linux Administration (Core)

#### Unit-I

**Overview of Linux :** What is Linux, Linux's root in Unix, Common Linux Features, advantage of Linux, Overview of Unix and Linux architectures, Linux files system, hardware requirements for Linux, Linux standard directories. Commands for files and directories cd, ls, cp, rm, mkdir, rmdir, pwd, file, more, less, Creating and viewing files using cat, file comparisons.

#### Unit II

**Essential Linux commands:** Processes in Linux, process fundamentals, connecting processes with pipes, redirecting input/output, Background processing, managing multiple processes, process scheduling – (at, batch), nohup command, kill, ps, who, find, sort, touch, file, file processing commands - wc, cut, paste etc Mathematical commands - expr, factor etc. Creating and editing files with vi editor.

#### Unit III

**Shell programming** - Basics of shell programming, various types of shell available in Linux, comparisons between various shells, shell programming in bash. Conditional and looping statements, case statement, parameter passing and arguments, Shell variables, system shell variables, shell keywords, Creating Shell programs for automating system tasks

#### Unit-IV

**System administration-** Common administrative tasks, identifying administrative files configuration and log files, Role of system administrator, Managing user accounts-adding & deleting users, changing permissions and ownerships, Creating and managing groups, modifying group attributes, Temporary disabling of users accounts, creating and mounting file system, checking and monitoring system performance - file security & Permissions, becoming super user using su. Getting system information with uname, host name, disk partitions & sizes, users, kernel, installing and removing packages with rpm command.

#### Unit-V:

**Simple filter commands:** pr, head, tail, cut, sort, uniq, tr - Filter using regular expression grep, egrep, sed **Understanding various Servers :**DHCP, DNS, Squid, Apache, Telnet, FTP,Samba.

#### *Book of study :*

1. Cristopher Negus - Red Hat Linux Bible, Wiley Dreamtech India 2005 edition.
2. Yeswant Kanethkar - UNIX Shell Programming, First edition, BPB.

#### *References :*



1. Official Red Hat Linux Users guide by Redhat, Wiley Dreamtech India
2. Graham Glass & King Ables - UNIX for programmers and users, Third Edition, Pearson Education.
4. Neil Mathew & Richard Stones - Beginning Linux Programming, Fourth edition, Wiley Dreamtech India.

## **CS4CRT11: Microprocessors and Assembly Language Programming (Complementary)**

### **Unit I**

Microprocessor architecture and its operations – microprocessor initiated operations and 8085 bus organization, internal data operations, 8085 registers, externally initiated operations. Memory – memory map, memory and instructions, peripheral mapped I/O. 8085 Microprocessor and its architecture.

### **Unit II**

8086 Internal architecture. Basic 8086 microcomputer system – system overview, 8086 bus, Read machine cycle, Write machine cycle. Assembly language programming – program development steps, 8086 instructions – data transfer instructions, arithmetic instructions, bit manipulation instructions, string instructions, program execution, Constructing the machine codes for 8086 instructions. Implementing standard program in 8086 - unconditional jump instructions, condition flags, conditional jump instructions, If-then, If-then else, and multiple if-then-else, while-do , repeat-until , loop instructions, instruction timing and delay loops.

### **Unit III**

Strings, Procedures and Macros – 8086 string instructions, writing and using procedures, CALL and RET instructions, stack, using PUSH and POP to save register contents, passing parameters, reentrant and recursive procedures, writing and using macros.

### **Unit IV**

8086 interrupts – program examples, interrupt Types, 8254 software – programmable TIMER/ COUNTER – basic 8253 and 8254 operations, 8255A, 8259A Priority interrupt controller. Direct Memory Access data transfer – circuit connections and operations of the Intel 8257 DMA controller, DMA transfer timing diagram.

### **Unit V**

Intel 80286 microprocessor – architecture, signals and system connections, Real address mode operation, protected mode operation. Intel 80386 32-bit microprocessor – architecture, pins and signals. Introduction to 80486 microprocessor. Introduction to RISC machines.

***Book of study:***

1. A.Nagoor Kani - Microprocessor 8086 programming & interfacing, Second edition, Tata McGraw Hill Education.
2. Microprocessors and Interfacing , Programming and Hardware, Douglas V- Hall. Tata McGraw-Hill, 1990.

***References:***

1. Barry B.Brey - Architecture, Programming and Interfacing ,Eighth Edition, Prentice – Hall India.
2. The Intel Microprocessors 8086 / 8088 , 80186 / 80188 , 80286 , 80386 , 80486 , Pentium, and Pentium Pro processor

**CS4CRT12 : Computer Aided Optimization Techniques (core)**

**Unit I**

OR: Introduction, origin and development, nature and features, scientific methods, modelling, advantages and limitations of models, solution methods for models, methodology, OR and decision making, applications, opportunities and shortcomings.

Linear Programming Problem: Introduction, Mathematical formulation of LPP, Graphical solution method and exceptional cases, General LPP, Canonical and Standard forms of LPP.

**Unit II**

Linear Programming Problem: Simplex method - Introduction, Properties, Computational Procedure of simplex method, Artificial variables, Two-Phase method, Big-M method.

Duality in Linear Programming: Introduction, General Primal-Dual pair, Formulating Dual problem, Dual Simplex Method.

### **Unit III**

Transportation Problem: Introduction, LP formulation, Existence of solution, Transportation Table, Loops, Solution – Initial Basic Feasible Solution (North West Corner method, Least Cost method and VAM) and Optimal Solution (MODI method and Stepping Stone method), Tran-shipment problems.

Assignment Problems: Introduction, Mathematical formulation, Solution – using Hungarian method, Special cases, Traveling Salesman problem.

### **Unit IV**

Sequencing Problem: Introduction, Problem of Sequencing, Basic Terms, Processing n jobs through 2 machines, Processing n jobs through k machines, Processing 2 jobs through k machines and Maintenance Crew Scheduling.

### **Unit V**

Network Routing Problems: Introduction, Network Flow Problems, Minimal Spanning Tree problem, Shortest Route problem, Maximal Flow problems – Augmenting path and Maxflow-Mincut methods.

Network Scheduling: Introduction, Basic Components, Logical Sequencing, Rules, Concurrent Activities, Critical Path Analysis – CPM, Probability Considerations and PERT method, Distinction between PERT and CPM, Applications, Advantages and Limitations.

#### ***Book of study:***

1. Kanti Swarup, P.K. Gupta, Man Mohan, Operations Research, 16<sup>th</sup> edition , Sultan Chand & Sons.

#### ***References:***

1. Hamdy A. Taha, Operations Research: An Introduction, 9<sup>th</sup> edition, Pearson
2. Prem Kumar Gupta and D.S. Hira, Problems in Operations Research, Sultan Chand & Sons.
3. K. V Mital and C. Mohan, Optimization Methods in Operations Research and System Analysis, Third edition, New Age International.

### **CS4CRT13 : Web Programming Using PHP(Core)**

#### **Unit I**

Introduction to web, WWW architecture, Fundamentals of HTML, text formatting tags, marquee, inserting images, links, lists, creating tables, frames, working with form elements.

## **Unit II**

CSS introduction, <link> and <style> elements, CSS properties, Controlling Fonts, Text formatting, Text- pseudo classes, Selectors, Links, Backgrounds, lists

Introduction to Java Script, Java Script variables, operators, decision control statements, looping, functions, arrays, events, popup boxes-alert, prompt, conform box, built-in objects, writing JavaScript, form validation

## **Unit III**

Introduction to PHP, server side scripting, role of web server software, php comments, variables, echo and print, PHP operators, data types, branching statements, loops, arrays

## **Unit IV**

PHP functions, PHP form, Passing information between pages, \$\_GET, \$\_POST, \$\_REQUEST. String functions, include and require, session and cookie management, error handling in PHP, Object Oriented Programming using PHP

## **Unit V**

Introduction to MySQL, data types, SQL commands-CREATE, UPDATE, INSERT, DELETE, SELECT, PHP functions for MySQL connectivity and operation- mysql\_connect, mysql\_select\_db, mysql\_query, mysql\_fetch\_row, mysql\_fetch\_array, mysql\_result, mysql\_list\_fields, mysql\_num\_fields, insertion, updation and deletion of data using PHP, displaying data from MySQL in webpage.

### ***Book of Study:***

1. Dave W Mercer, Allan Kent, Steven D Nowicki, David Mercer, Dan Squier, Wankyu Choi- “Beginning PHP5”, Wiley Publishing, Inc
2. Ivan Bayross -“HTML, DHTML, JavaScript, Pearl & CGI ”, , BPB Publication

### ***Reference Books:***

1. Rasmus Lerdorf and Kevin Tatore, “Programming PHP”, Shroff Publishers & Distributors Pvt. Ltd
2. Dave W Mercer, Allan Kent, Steven D Nowicki, David Mercer, Dan Squier, Wankyu Choi, “Beginning PHP” Wiley Publishing, Inc

**CS4CRP04 : Assembly Language Programming Lab (Complementary)**

**(Five programs from each section and 12 hrs per section.)**

1. Simple Arithmetic Calculations
2. Conditional Statements
3. Control Statements
4. Loop and Arrays
5. Character Strings
6. Subroutines and Stack Operations

Scheme of Evaluation for lab external is as follows:

**Division of Marks (Practical - 3 hours External)**

**First program - questions from 1 to 3 - 25 marks**

(Logic – 12 marks, Successful compilation – 8 marks, Result – 5 marks)

**Second program should be based on advanced concepts – questions from 4 to 6 - 35 marks**

(Logic – 20 marks, Successful compilation – 10 marks, Result – 5 marks)

**Viva Voce - 10 marks**

**Lab Record (minimum of 20 Programs) - 10 marks**

Total 80 marks

**CS4CRP05 : Software Lab - IV**

Section 1 : Module I,II,III

- Creating simple webpages using HTML tags and CSS.
- Simple validation programs using Java Script.
- PHP including Loops, decision statements and arrays

Section 2 : Module IV,V

- PHP programs using session.
- PHP programs using Data base connectivity

**Division of Marks (Practical - 3 hours External)**

<b>First program - questions from Modules 1 to 3</b>	<b>- 25 marks</b>
<b>Second program should be based on advanced concepts – questions from modules 4 to 6</b>	<b>- 35 marks</b>
<b>Viva Voce</b>	<b>- 10 marks</b>
<b>Lab Record (minimum of 20 Programs)</b>	<b>- 10 marks</b>
<b>Total</b>	<b>80marks</b>

## **B.Sc. Computer Science - SEMESTER V**

### **CS5CRT14 : System Software and Operating Systems (Core)**

#### **Unit I**

System software- General concepts, Language processing concepts, Fundamentals of Language processing, Fundamentals of language specification - Programming Language Grammar, Classification of grammar. Assemblers: Elements of assembly language programming – assembly language statements, Design specification of an assembler. Macros: Definition- Call- Expansion.

#### **Unit II**

Scanning & Parsing : Finite State Automata. Parsing - Parse trees ,topdown parsing,bottom up parsing. Compilers - Phases of compiler- Aspects of compilations- code optimization. Linkers and Loaders - Relocation and linking concepts- Design of linker-Type of loaders.

#### **Unit III**

Operating System: OS Definition, Functions, OS as a resource manager, types of OS Evolution of OS, Operating System Services. Process:Basic Concepts, Process Scheduling, Operations on Processes, Inter process communication, CPU Scheduling - Scheduling Criteria, Scheduling Algorithms.

#### **Unit IV**

Process Synchronization -The Critical Section problem,Semaphores. Dead Locks : System Model, Dead Lock Characterization, Methods of Handling Dead Locks, Dead Lock Prevention, Dead Lock Avoidance, Dead Lock Detection, Recovery from Dead Lock.

#### **Unit V**

Memory Management:Memory Management Strategies -Swapping, Contiguous memory allocation, Paging, Segmentation, Page Replacement.File System :- File Concept, Access Methods, Allocation Methods.

#### ***Book of study:***

1. D M Dhamdhere - System programming and operating Systems , Tata McGraw Hill
2. Abraham Silberschatz, Peter Galvin and Greg Gagne - Operating System Principles, Seventh Edition, John Wiley

#### ***Reference :***

1. John J Donovan - System Programming, First edition, Tata McGraw Hill 2009.
2. William Stallings - Operating Systems, Sixth edition, Prentice Hall of India 2010.

## CS5CRT15 : IT & Environment (Core)

### Unit 1 : (18 hrs.)

**Multidisciplinary nature of environmental studies** : Definition, scope and importance, Need for public awareness. (2 hrs)

**Natural Resources**: Renewable and non-renewable resources: Natural resources and associated problems. a) **Forest resources**: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. b) **Water resources**: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. c) **Mineral resources**: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d) **Food resources**: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. e) **Energy resources**: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources, Case studies. f) **Land resources**: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of individual in conservation of natural resources. Equitable use of resources for sustainable life styles. (10hrs)

**Ecosystems** : Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids., Introduction, types, characteristic features, structure and function of the given ecosystem:- Forest ecosystem

( 6 hrs)

### Unit 2: (26 hrs)

**Biodiversity and its conservation**: Introduction, Biogeographical classification of India, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values., India as a mega-diversity nation, Hot-spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India

( 8 hrs)

**Environmental Pollution** :Definition, Causes, effects and control measures of: - Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards, Solid waste Management: Causes, effects and control measures of urban and industrial wastes., Role of an individual in prevention of pollution, Pollution case studies, Disaster management: floods, earthquake, cyclone and landslides. (8 hrs)

**Social Issues and the Environment** :Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people: its problems and concerns, Case studies, Environmental ethics: Issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion , nuclear accidents and holocaust, Case studies, Consumerism and waste products, Environment Protection Act , Air ( Prevention and Control of Pollution) Act, Water



(Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness. (10hrs)

**Unit 3:** (10 hrs.)

Internet as a knowledge repository, academic search techniques, creating cyber presence. Academic websites, open access initiatives, opens access publishing models, Introduction to use of IT in teaching and learning -Educational software, Academic services–INFLIBNET, NPTEL, NICNET, BRNET . (10hrs)

**Unit 4:** (10 hrs.)

IT & Society- issues and concerns- digital divide, IT & development, the free software movement , IT industry: new opportunities and new threats, software piracy, cyber ethics, cyber crime, cyber threats, cyber security, privacy issues, cyber laws, cyber addictions, information overload, health issues- guide lines for proper usage of computers, internet and mobile phones. e-wastes and green computing, impact of IT on language & culture-localization issues- Unicode- IT and regional languages, Green Computing Concept. (10hrs)

**Unit 5:** (8 hrs.)

**Human Rights**– An Introduction to Human Rights, Meaning, concept and development, Three Generations of Human Rights (Civil and Political Rights; Economic, Social and Cultural Rights).

**Human Rights and United Nations** – contributions, main human rights related organs - UNESCO, UNICEF, WHO, ILO, Declarations for women and children, Universal Declaration of Human Rights. **Human Rights in India** – Fundamental rights and Indian Constitution, Rights for children and women, Scheduled Castes, Scheduled Tribes, Other Backward Castes and Minorities

**Environment and Human Rights** - Right to Clean Environment and Public Safety: Issues of Industrial Pollution, Prevention, Rehabilitation and Safety Aspect of New Technologies such as Chemical and Nuclear Technologies, Issues of Waste Disposal, Protection of Environment **Conservation of natural resources and human rights:** Reports, Case studies and policy formulation. Conservation issues of western ghats- mention Gadgil committee report, Kasthuriengan report. Over exploitation of ground water resources, marine fisheries, sand mining etc. (8 Hrs)

**Internal: Field study**

- Visit to a local area to document environmental grassland/ hill /mountain
- Visit a local polluted site – Urban/Rural/Industrial/Agricultural Study of common plants, insects, birds etc
- Study of simple ecosystem-pond, river, hill slopes, etc

### **References:**

- 1 .“Technology in Action” Alan Evans, Kendall Martin, Mary Anne Poatsy, Pearson
2. Bharucha Erach, Text Book of Environmental Studies for undergraduate Courses. University Press, IInd Edition 2013 (TB)
- 3 .Clark.R.S., Marine Pollution, Clanderson Press Oxford (Ref)
4. Cunningham, W.P.Cooper, T.H.Gorhani, E & Hepworth, M.T.2001 Environmental Encyclopedia, Jaico Publ. House. Mumbai. 1196p .(Ref)
5. Dc A.K.Enviornmental Chemistry, Wiley Eastern Ltd.(Ref)
- 6 .Down to Earth, Centre for Science and Environment (Ref)
7. Heywood, V.H & Watson, R.T. 1995. Global Biodiversity Assessment, Cambridge University Press 1140pb (Ref)
8. Jadhav.H & Bhosale.V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284p (Ref)
9. Mekinney, M.L & Schock.R.M. 1996 Environmental Science Systems & Solutions. Web enhanced edition 639p (Ref)
- 10 .Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co. (TB)
- 11 .Odum.E.P 1971. Fundamentals of Ecology. W.B. Saunders Co. USA 574p (Ref)
12. Rao.M.N & Datta.A.K. 1987 Waste Water treatment Oxford & IBII Publication Co.Pvt.Ltd.345p (Ref)
13. Rajagopalan. R, Environmental Studies from crisis and cure, Oxford University Press, Published: 2016 (TB)
14. Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut (Ref)
15. Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science (Ref)
16. Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Stadards, Vol I and II, Enviro Media (Ref)
17. Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (Ref)
18. Wanger K.D., 1998 Environmental Management. W.B. Saunders Co. Philadelphia, USA 499p (Ref)
- 19.M-Magazine, R-Reference                      TB- Text Book

## **CS5CRT16 : Java Programming using Linux (Core)**

### **Unit I**

Concepts of Object oriented programming, Benefits of OOP, Features of Java. Java environment, Java tokens, Constant, variables, data types, operators, Control Statements-branching statements, looping statements, jump statements, labeled loops.

### **Unit II**

Defining a Class, Fields declaration, Method declaration, Creating object, Accessing class members, method overloading, Constructors, constructor overloading, super keyword, static Members, Inheritance, overriding methods, dynamic method dispatch, final(variables, methods and classes), abstract methods and classes, interfaces, visibility control.

### **UNIT III**

Arrays- One dimensional arrays, declaration, creation, initialization of arrays, two dimensional arrays, String class. Packages: - Java API packages overview (lang, util, io, awt, swing, applet), user defined packages-creating packages, using packages

Exception Handling Techniques-try-catch-throw-throws-finally -Multi-threading- creation of multi-threaded program-Thread class-Runnable interface, Thread life cycle.

### **UNIT IV**

Event Handling-Delegation Event Model-Event Classes-Sources of Events-Event Listeners- Event classes- Swing- architecture, components of swing- JLabel, JButton, JCheckBox, JRadioButton, JList, JComboBox, JTextField, JText Area, JPanel, JFrame, Layout Managers(Flow Layout, Grid Layout, Card Layout, Border Layout, Box Layout, Null Layout ).

### **UNIT V**

Applet Fundamentals -applet tag, applet life cycle, passing parameters to applets. Working with graphics - Line, Rectangle, Oval, Arc, color setting. JDBC architecture- JDBC connection, JDBC statement object, JDBC drivers.

### ***Book of study :***

1. E. Balagurusamy- Programming with Java , Third Edition, McGraw Hill Companies.
2. K. Somasundaram - PROGRAMMING IN JAVA2, First Edition, Jaico Publishing House.

***Reference:***

1. Patrick Naughton - Java2 The Complete Reference, Seventh Edition:
2. Cay S Horstmann & Gary Cornell - Core Java Volume 1- Fundamentals, Eighth edition.
3. Java 6 Programming Black Book 2007 Edition, Dreamtech press.

**CS5CRT17 : Computer Security (Core)**

**Unit I**

Introduction-Principles of Security- Need for Security- Threats- Attacks

**Unit II**

Cryptography :Cipher Methods: Caesar cipher -One time pad – Mono alphabetic Cipher -Play fair cipher- Poly alphabetic cipher -Vigenère – Cipher, Transposition ciphers – Cryptographic Algorithms: Symmetric & Asymmetric- Cryptographic tools: PKI- Digital Signatures-Stenography

**Unit III**

System Security :

Intrusion Detection and Prevention Systems, Why IDPS? Types of IDPS,Password Management, Countermeasures

**Unit IV**

Network Security:Electronic Mail Security, Pretty Good Privacy, S/MIME, IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload.

**Unit V**

Web Security: Web Security considerations- Secure Socket Layer -Transport layer Security-Secure electronic transaction. Firewalls-Packet filters- Application Level Gateway-Circuit Level Gateway.

***Book of Study:***

1. Michael E. Whitman, Herbert J. Mattord, “Principles of Information Security” Fourth Edition

2. William Stallings, “Cryptography and Network Security – Principles and Practices”, Fourth Edition, 2006, Pearson Education.

**Reference :**

1. Behrouz A. Forouzan, Dedeep Mukhopadhyay “Cryptography & Network Security”, Second Edition, Tata McGraw Hill, New Delhi, 2010.
2. Atul Kahate, “Cryptography and Network Security”, Second Edition, Tata McGraw Hill

**OPEN COURSE**

**CS5OPT01 Informatics and Cyber Ethics**

**Unit I**

The Internet, TCP/IP, IP Addressing, Client Server Communication, Intra-net, WWW, Web Browser and Web Server, Hyper links, URLs, Electronic mail.

**Unit II**

Internet as a knowledge repository, academic search techniques, creating cyber presence. Academic websites, open access initiatives, open access publishing models, Introduction to use of IT in teaching and learning -Educational software, Academic services–INFLIBNET, NPTEL, NICNET, BRNET.

**Unit III**

Introduction to purchase of technology, License, Guarantee, Warranty, Basic concepts of IPR, copyrights and patents, plagiarism. IT & development, the free software movement

**Unit IV**

Cyber space, information overload, cyber ethics, cyber addictions, cybercrimes– categories

–person, property, Government–types-stalking, harassment, threats, security & privacy issues.

## **Unit V**

Cyber Addiction, Information Overload, Health Issues, e-Waste and Green computing impact of IT on language & culture-localization issues- Unicode- IT and regional languages e-Governance in India, IT for National Integration, Role of IT.

### ***Book of Study:***

1. Alan Evans, Kendall Martin, Mary Anne Poatsy -“Technology in Action”, Pearson

### ***References:***

1. Dinesh Maidasani “Learning Computer Fundamentals, MS Office and Internet & Web Technology”, Firewall Media, Lakshmi Publications.
2. V Rajaraman - “Introduction to Information Technology”, Prentice- Hall of India.
3. Barkhs and U. Rama Mohan - HTML Black Book 3. “Cyber Law Crimes”, Asia Law House, New Edition
4. Peter Nortons- Introduction to Computers, Sixth Edition, Published by Tata McGraw Hill

## **CS5OPT02 – Computer Fundamentals, Internet & MS Office**

### **Unit I**

Computer Fundamentals: History, Generations, Classifications, Operating Systems, Types of Networks

### **Unit II**

The Internet, TCP/IP, IP Addressing, Client Server Communication, Intra-net, WWW, Web Browser and Web Server, Hyper-links, URLs, Electronic Email

### **Unit III**

Word processing: Introduction, Microsoft Word, Basic Menus, Formatting the text & paragraph, Working with Index

### **Unit IV**

Spread Sheet: Introduction, Microsoft Excel, Basic Menus, Formulas, Basic functions, Charts and Graphs.

## **Unit V**

MicrosoftPower Point: Introduction, Basic Menus, Template, Slide Basics, Charts, Adding Multimedia & Animation.

### ***Book of Study:***

1. “Learning Computer Fundamentals, MS Office and Internet & Web Technology”, Dinesh Maidasani, Firewall Media, Lakshmi Publications.

### ***References:***

1. Harley Hahn - “Internet Complete Reference”, , Second Edition, Tata McGraw Hill Education
2. Gary B. Shelly, Misty E. Vermaat - “Microsoft Office 2010: Advanced” , CENGAGE Learning 2010

## **CS5CRP06 : Software Development Lab - I**

**Part I.** Java Programs: using class and read inputs from keyboard , Method Overloading- Method Overriding- inheritance- JDBC connection -Exception Handling

**Part II** Mini Project using Java

**Scheme of Evaluation for software Development lab I external is as follows:**

### **Division of Marks (Practical - 3 hours External)**

**First program - part I - 20 marks**

(Logic – 10 marks, Successful compilation – 6 marks, Result – 4 marks)

**Lab Record (minimum of 10 Programs) - 5 marks**

**Project demonstration and Presentation - 30 marks**

**Viva Voce - 15 marks**

**Project Report - 10 marks**

## B.Sc.Computer Science - SEMESTER VI

### CS6CRT18 : Computer Graphics (Core)

**Unit 1 :** (12 hrs. )

**Introduction:** A survey of Computer Graphics, overview of graphics systems-Video display devices-Refresh CRT, Raster-Scan and Random-Scan Displays ,Color CRT Monitors, DVST, Flat-Panel Displays , Raster Scan systems, Random scan systems, Input devices, Hard copy devices, Graphics software.

**Unit 2:** (14 hrs.)

**Output primitives:** Line drawing algorithms: DDA algorithm, Bresenham's line algorithm, Circle generating algorithm- Midpoint circle algorithm, Character generation.

**Unit 3:** (18 hrs. )

**2D geometric Transformations:** Basic transformations: Translation, Rotation, Scaling; Other transformations-Reflection and shear, Matrix representation and homogenous coordinates, Composite transformation, Interactive picture construction Techniques.

**Two-dimensional viewing:** viewing pipeline, window and viewport, window to viewport transformation. Clipping operations- Point clipping, Line clipping:- Cohen Sutherland line clipping, Polygon clipping:- Sutherland- Hodgeman polygon clipping, Text Clipping.

**Unit 4:** (14 hrs. )

**Three-dimensional concepts:** Three dimensional display methods, Three dimensional object representations- Polygon surfaces, Sweep representations, Constructive solid geometry methods, octrees and quadrees.

Unit 5 (14 Hrs)

**Computer Animation:** Design of animation sequences, raster animations, computer animation languages, key-frame systems, morphing, motion specifications.

**Book of study :**

1.Donald D.Hearn & M. Pauline Baker, Computer Graphics C Version, Second Edition,, PHI Pvt. Ltd.

**References:**

- 1.Newman W M & R F Sproul, Principles of Interactive Computer Graphics, Second Edition Mc-Graw Hill Publishers.
- 2.Plastock R & Xiang Z, Theory and problems of computer Graphics, Second Edition Schaum Series, McGraw Hill Publishers.



## **CS6CRT19 : Big Data Analytics**

### **Unit I: Introduction to Big Data**

Introduction to BigData Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error.

### **Unit II: Mining Data Streams**

Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

### **Unit III : Hadoop**

History of Hadoop- The Hadoop Distributed File System – Components of Hadoop-Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Java interfaces to HDFS- Basics- Developing a Map Reduce Application-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce Features.

### **Unit IV : Hadoop Environment**

Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation - Hadoop Configuration-Security in Hadoop - Administering Hadoop – HDFS - Monitoring-Maintenance-Hadoop benchmarks- Hadoop in the cloud

### **Unit V : Frameworks**

Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphere BigInsights and Streams. Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications

### ***Book of Study:***

1. Michael Berthold, David J. Hand, “Intelligent Data Analysis”, Springer, 2007.
2. Tom White “ Hadoop: The Definitive Guide” Third Edition, O’reilly Media, 2012.
3. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, “Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data”, McGrawHill Publishing, 2012

## **References:**

1. Anand Rajaraman and Jeffrey David Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2012.
2. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Wiley & sons, 2012.
3. Glenn J. Myatt, “Making Sense of Data”, John Wiley & Sons, 2007
4. Pete Warden, “Big Data Glossary”, O’Reilly, 2011.

## **Elective Papers**

### **CS6PET01: Python and LaTeX**

#### **Module I - Introduction to Python**

The Python Programming Language , Variables , Basic expressions and statements , Arithmetic Operators , Data types - Type conversion , Numbers, Floats , String operations

#### **Module II - Control Flow and Data Structures**

Logical operators , if , If-Else , While loop , For loop , List value, length, operation and deletion , Dictionary operation & methods , Tuples

#### **Module III – Functions**

Basic inbuilt functions , User defined functions , Function Calls , Parametrized function calls , Function returns , Recursive functions , Scope concepts - local, global

#### **Module IV - Files and user I/O**

User input , Reading files , Writing to files , Directories , Interactive programming , Pickling , Exceptions

#### **Module V - Basic LaTeX**

What is LaTeX , Structure -Layout - Margin, Header/Footer , Sectioning , Bullets and Numbering , Images

***Book of Study:***

1. Downey, A. et al., "How to think like a Computer Scientist: Learning with Python", John Wiley, 2015
2. Stefan Kottwitz "LaTeX: Beginner's Guide"Packt Publishing, 2011

***References:***

- 1.Swaroop C H, "Byte of Python", CreateSpace Independent Publishing Platform, 2015
2. Zed Shaw, "Learn Python the Hard Way",Addison-Wesley, 2014
- 3.WikiBooks - <https://en.wikibooks.org/wiki/LaTeX/>
4. F. Mittelbach and M Goossens with Braams, Carlisle, and Rowley, "The LaTeX Companion", Addison-Wesley Second edition

**CS6PET02: Digital Image Processing**

**Module I: Digital Image Fundamentals**

Definition of an image, different types of images, digital image processing-definition, advantages, applications. Basic steps in DIP, elements of visual perception, pixel relationship.

**Module II: Image Enhancement In Spatial Domain**

Basics, histogram manipulation. Spatial filtering: smoothing linear filters, order- statistics filter- median filter and mean filter; sharpening filters-the Laplacian.

**Module III: Image Enhancement In Frequency Domain**

Fourier transform and frequency domain, basis of filtering in frequency domain. Smoothing filters-Ideal, Butterworth, Gaussian low pass filter; Sharpening filters- Ideal, Butterworth, Gaussian high pass filters.

**Module IV: Morphological Image Processing**

Introduction, basis of set theory, Dilation, Erosion, Structuring elements, Opening and Closing, Top hat and bottom hat transformation.

Module V: Image Segmentation Point, line, edge detection-detection of isolated points, basic edge detection; Pixel based approach-Basics of intensity thresholding, Basic global thresholding; region based segmentation-region growing, region splitting and merging.

***Book of Study :***

1. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing, Third Edition
2. S. Jayaraman, S. Esakkirajan, T. Veerakumar , Digital Image Processing

***References :***

1. Anil K Jain, Fundamentals of Digital Image Processing , Pearson Education 2003

**CS6PET03 : Cloud Computing**

**Unit 1: (14 hrs.)**

Introduction: Cloud Computing at a Glance, Historical Developments, Building Cloud Computing Environments, Computing Platforms and Technologies, Principles of Parallel and Distributed Computing: Eras of Computing, Parallel vs. Distributed Computing, Elements of Parallel Computing, Elements of Distributed Computing.

**Unit 2: (14 hrs.)**

Virtualization: Introduction, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples.

**Unit 3: (14 hrs.)**

Cloud Computing Architecture :Introduction, Cloud Reference Model, Types of Clouds, Economics of the Cloud, Open Challenges.

**Unit 4: (16 hrs.)**

Aneka: Cloud Application Platform: Framework Overview, Anatomy of the Aneka Container, Building Aneka Clouds, Cloud Programming and Management, Data Intensive Computing: Map-Reduce Programming - What is Data-Intensive Computing?, Technologies for Data-Intensive Computing, Aneka MapReduce Programming.

## **Unit 5: (16 hrs.)**

Cloud Platforms in Industry: Amazon Web Services, Google AppEngine, Microsoft Azure, Cloud Applications: Scientific Applications, Business and Consumer Applications.

### ***Book of Study:***

1. Rajkumar Buyya, Christian Vecchiola, S ThamaraiSelvi- Mastering Cloud Computing, Tata McGraw Hill Publications.

### ***References:***

- 1.Kumar Saurabha, “Cloud Computing “ Wiley Publication Krutz ,Vines “Cloud Security”.  
Wiley Publication.
2. A Srinivasan & J. Suresh “ Cloud Computing : A Practical Approach for learning and Implementation “ , First edition ,Pearson

## **CS6SMP07 : Seminar**

Each student can choose a latest topic of current day interest in the areas of Computer Science / Information Technology and present a seminar presentation using appropriate presentation media. A seminar presentation report in bound form in the pattern of a complete technical report (with contents page, well structured presentation, references etc.) should be submitted. There will not be any external evaluation for the Software lab VI and Seminar Presentation

**Scheme of Evaluation of Seminar Presentation (core) (INTERNAL) is as follows:**

### **Division of Marks**

#### **Seminar Presentation Internal (100 marks)**

<b>Presentation</b>	<b>- 40 marks</b>
<b>Questions and Answers</b>	<b>- 30 marks</b>
<b>Documentation</b>	<b>10 marks</b>
<b>Seminar report with proper Content and Binding</b>	<b>- 20 marks</b>
<b>Total Marks</b>	<b>-100 marks</b>

**CA6CRP08 : Software Development Lab II (Main Project ) ( Core)**

Software development lab: 7 hrs. per week

**Individual project.**

The project topic shall be chosen from areas of current day interest using latest packages / languages running on appropriate platforms (Except the tools used in software development-I), so that the student can be trained to meet the requirements of the Industry. A project report should be submitted in hard bound complete in all aspects. For internal evaluation, the progress of the student shall be systematically assessed through various stages of evaluation at periodic intervals.

**Scheme of Evaluation for Software Development Lab II external is as follows:**

**Division of Marks (Software Development Lab II)**

Project demonstration and Presentation	- 40 marks
Viva related to project	- 20 marks
Project report with proper content and binding	-20 marks
<b>Total Marks</b>	<b>- 80marks</b>

CS6VVT01 –VIVA VOCE (Core)

Credit :1

**Scheme of Evaluation of Viva voce (core) for External is as follows:**

Each student should attend a course viva voce based on syllabus from semester I to semester IV.

**Total Marks – 100 marks**