MSC (Computer Science)

Scheme and Syllabus

FIRST SEMESTER							
S. NO.	**CODE**	**SUBJECT**	**Category**	**L**	**T**	**P**	**C**
1	**CSL701**	**Fundamentals of CS and C programming**	**DC**	**3**	**1**	**2**	**5**
2	**CSL 373**	**Operating Systems**	**DC**	**3**	**1**	**0**	**4**
3	**HUL103**	**Business Communication**	**HU**	**2**	**0**	**0**	**2**
4	**CSL277**	**Web Technology-I**	**DC**	**3**	**1**	**4**	**6**
5	**CSL-740**	**Software Engineering**	**DC**	**3**	**1**	**0**	**4**
6	**CSL-753**	**Advanced Database management system**	**DC**	**3**	**1**	**2**	**5**

CSL 701 FUNDAMENTALS OF CS AND C PROGRAMMING

5 credits (3-1-2)

Unit-1:

Introduction to Computers: Evolution of Computers, Generation of Computers, Classification of Computers– Analog, Digital, Hybrid Computers. Classification of Computers according to Size- Super Computers, Mainframe Computers, Personal Computers (Different Types) and Terminals (Different types), characteristics of computers, advantages and disadvantages of computers, Block Diagram of a Digital Computer.

Introduction to Programming: Types of Programming Languages, Software, Classification of Software, Application software and System Software, Structured Programming, Algorithms and Flowcharts with Examples, Programming Logic.

Introduction & the C character set: History of C, Structure of a C program, Constants, variables and keywords, Types of C constants and variables, Rules for constructing variable names

Unit-2:

C Instructions: Type declaration and arithmetic instructions Integer and float conversions, Type conversion in assignment Operators in C, Hierarchy of operations Control Instructions

Control Structures: Decision control structures, logical operators, conditional operator, relational operators. Loop control structures- while, do-while, for Break statement, Continue statement, case control structure, go to statement

Arrays: One dimensional and multidimensional arrays Declaration, initialization, reading values into an array, displaying array contents

Unit-3:

Strings: Basic concepts, standard library string functions- strlen, strcpy, strcmp, strcat&strrev. Two dimensional arrays of strings

Functions: Definition, function definition and prototyping, types of functions, passing values to functions, recursion, passing arrays to functions I/O functions- formatted & unformatted console I/O functions

Storage classes in C: Automatic, Register, Extern and Static Variables

Unit-4:

Pointers: Definition, notation. Pointers and arrays, array of pointers. Pointers and functions- call by value and call by reference. Pointers and strings.

Structures and Unions: Definition, declaration, accessing structure elements Array of structures Pointers and structures Unions – definition, declaration, accessing union elements type def statement.

Unit-5:
Files: File opening modes String I/O in files, formatted disk I/O functions, Text mode and Binary mode, Record I/O in files Bitwise operators Bitwise AND, OR, exclusive OR, complement, right shift and left shift operators .

C pre-processor : Types of C pre processor directives, Macros- comparison with functions, File Inclusion.

Text Books:
1. Kanetkar, Yashavant: "Let Us C", 4th Edition. BPB Publications.
2. Gottfried, Byron S: "Programming with C", 1996. Tata McGraw-Hill.

Reference Books:
1. Balagurusamy, E: "Programming in ANSI C" 2nd Edition. Tata McGraw-Hill.
2. Deitel, H M and Deitel P J: "C How to Program", 2nd Edition. Prentice-Hall.

HUL 103 Business Communication
2 Credits (2-0-0)

Unit 1: Introducing Business Communication
Concept, Nature, Scope, Types, Function , Communication models and process communication Channels– Formal, Informal, Downward, Upward and Horizontal, Essentials of effective communication, limitations of communication, Barriers of communication, Overcoming the barriers of communication, Grapevine

Unit 2: Oral Communication
Oral Communication, Effective oral communication, methods of oral communication, conversion skills, Presentation skills; Nonverbal communication, Interview skills – Interview process & requirements of a successful interview. Resume preparation and letter of Application.

Unit 3: Corporate Communication
Practices in Business communication- Group Discussions, Mock Interviews, Seminars, Importance of Listening, Individual.

Unit 4: Group presentation and Report Writing
Group presentation and Report Writing

Unit 5: Business Writing & Correspondence
Written Communication- Essentials of Written Communications, Basic Requirements of Business Letter, Business Letters & Memo Formats, Good News and Bad News Letter, Appearance Request, Letter, Sales Letter, Credit Letter, Complaints and Adjustment Letter, Quotation and offers.

Recommended Books:
1. Lesikar, R.V. and J.D. Petitt, Jr. Business Communication: Theory and Application Homewood III; Richard D. Irwin.
2. Michael, V.P. Communication and Research for management Himalaya Publishing House, Bombay.
3. Sharma, R.C & K. Mohan. Business Report writing and Correspondence (TMH).
4. Aggarawal, Rohini; Business Communication and organization & Management (Taxmann's).
5. Rao Nageshwar & Das R.P. – Communication skills Himalaya Publishing House, Delhi.
6. Taylor Shirley, Communication for Business, Pearson

CSL-373 OPERATING SYSTEMS
4 credits (3-1-0)

Unit-1:
Introduction to the Operating System (OS), Types of OS: Batch System, Time Sharing System, Real Time System. Multi Programming, Distributed System, Functions and Services of OS.

Unit-2:
Process Management: Process Concept, Process State, Process Control Block, Process Scheduling, CPU Scheduling - CPU Scheduling, Scheduling Criteria, Scheduling Algorithms, Preemptive & Non Preemptive Scheduling.

Unit-3:
Deadlocks-System model, Characterization, Deadlock Prevention, Deadlock Avoidance and Detection, Recovery from deadlock.

Unit-4:
Memory Management: Logical Address, Physical Address Contiguous Allocation, External and Internal Fragmentation

Virtual Memory: Demand paging, page replacement, allocation of frames, thrasing.

Unit-5:
Information Management: File Concept, Access Methods, Directory Structure. Device Management: Disk Structure, Disk Scheduling Algorithms.

Text books:

1. Silbershatz and Galvin," Operating System Concept", Addition We seley,

Reference books:

Tannenbaum,"Operating System Concept", Addition Weseley, 2002.

CSL-277 WEB TECHNOLOGIES-1
5 credits (3-1-2)

Unit - I
Web Essentials: Clients, Servers, and Communication. The Internet Protocols, HTTP, HTTPS,
Markup Languages: An Introduction to HTML, History-Versions.
Web Design: Concepts of effective web design, Web design issues including Browser, Bandwidth and Cache, Display resolution, Look and Feel of the Website, Page Layout and linking, User centric design, Sitemap, Planning and publishing website, Designing effective navigation, URL, Web Browser.
Unit – II
HTML: Basics of HTML, formatting and fonts, commenting code, color, hyperlink, lists, tables, images, forms, Meta tags, Character entities, frames and frame sets, HTML Form and its controls, Browser architecture and Web site structure. Overview and features of HTML5

Unit - III
CSS: Need for CSS, introduction to CSS, basic syntax and structure, Concept of style sheet ,using CSS, background images, colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, Positioning using CSS, Concept of Media Queries for responsive websites for devices CSS2, Overview and features of CSS3 and CSS4.
Unit - IV
Java Script: Introduction to Documents, Client side scripting with JavaScript, variables, functions, conditions, loops and repetition, Pop up boxes, Advance JavaScript: forms, Statements, functions, objects in JavaScript, Arrays, FORMS, Buttons, Checkboxes, Text fields and Text areas.
Unit - V
Introduction to XML, uses of XML, simple XML, Concept of Web Server, Web Server Architecture, Domain name registration, Web Hosting, Uploading website on server, FTP, FTP Clients, Downloading Website, basic concept of SEO, Use of social plugins for website including Facebook, Google MAP and Social Media Sharing, Using Bootstrap Layout ,Email Clients, Visitor Counter.

Text Books:
1. Burdman, Collaborative Web Development , Addison Wesley.
2. Bayross Ivan, Web Technologies Part II , BPB Publications.
Reference Books:
1. Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition, Pearson Education,
2. Deitel,Goldberg, "Internet & World Wide Web How To Program", Third Edition, Pearson Education.
3. Marty Hall and Larry Brown,"Core Web Programming" Second Edition, Volume I and II, Pearson Education,
4. Bates, "Developing Web Applications", Wiley,

CSL-740 Software Engineering
4 credits (3-1-0)

Unit-1:
Introduction: Introduction to software engineering, Importance of software, The evolving role of software, Software Characteristics, Software Components, Software Applications, Software Crisis, Software engineering problems, Software Development Life Cycle, Software Process.

Unit-2:
Software Requirement Specification: Analysis Principles, Water Fall Model, The Incremental Model, Prototyping, Spiral Model, Role of management in software development, Role of matrices and Measurement, Problem Analysis, Requirement specification, Monitoring and Control.
Software-Design: Design principles, problem partitioning, abstraction, and top down and bottom up design, Structured approach, functional versus object oriented approach, design specifications and verification, Monitoring and control, Cohesion, Coupling, Fourth generation techniques, Functional independence, Software Architecture, Transaction and Transform Mapping, Component – level Design, Fourth Generation Techniques

Unit-3:
Coding: Top-Down and Bottom –Up programming, structured programming, information hiding, programming style and internal documentation.

Testing: Testing principles, Levels of testing, functional testing, structural testing, test plane, test case specification, reliability assessment, software testing strategies, Verification & validation, Unit testing, Integration Testing, Alpha & Beta testing, system testing and debugging

Unit-4:
Software Project Management: The Management spectrum- (The people, the product, the process, the project), cost estimation, project scheduling, staffing, software configuration management, Structured Vs Unstructured maintenance, quality assurance, project monitoring, risk management.

Unit-5:

Software Reliability & Quality Assurance: Reliability issues, Reliability metrics, Reliability growth modeling, Software quality, ISO 9000 certification for software industry, SEI capability maturity model, comparison between ISO & SEI CMM.

CASE (Computer Aided Software Engineering): CASE and its Scope, CASE support in software life cycle, documentation, project management, Reverse Software Engineering, Architecture of CASE environment.

Text Books:

1. Pressman, Roger S., "Software Engineering: A Practitioner's Approach", McGraw Hill
2. Jalote, Pankaj, "Software Engineering", Narosa
3. Schaum's Series, "Software Engineering", TMH

Reference Books:

1. Alexis, Leon and Mathews Leon, "Fundamental of Software Engineering", Vikas
2. Sommerville, Ian, "Software Engineering", AWL, 2000

CSL-753 Advance Database Management System
5 credits (3-0-2)
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Unit-1:
Introduction: Elements of Database System, Characteristics of database approach, File system versus DBMS, data models, DBMS architecture and data independence. Role of DBA, DDL, DML and DCL.

Unit-2:
E-R Modeling: Entity types, entity set, attribute and key, relationships, relation types, roles and structural constraints, weak entities, enhanced E-R and overview of object modeling. Specialization and generalization.

Unit-3:
Relational Data Model: Relational model concepts: The catalog, base tables and views. Relational Data Objects - Domains and Relations: Domains, relations, kinds of relations, relations and predicates, relational databases. Relational constraints, relational algebra.

SQL: SQL queries, programming using SQL (PL/SQL), Integrity Constraints, Roles and privileges. PL/SQL – Introduction to PL/SQL – Declare, begin statements, Variables, Control Structure, PL/SQL Transactions – Savepoint, Cursor, PL/SQL Database Objects – Procedures, Functions, Packages, Triggers. Programmatic SQL – Embedded SQL

Unit-4:
Data Normalization: Functional dependencies, Normal form up to 3rd normal form & BCNF

File and system structure : overall system structure, file organization, logical and physical file organization, sequential and random, hierarchical, inverted, multi list, indexing and hashing, Btree index files.

Unit-5:

Concurrency Control: Transaction processing, locking techniques, database recovery, security and authorization. Overview of recovery techniques and Database Security.

Text Books:

1. Silberschatz Abraham, Korth Henry & Sudarshan S., Database Systems Concepts, McGraw Hill, 1997.
2. Date C.J., an Introduction to Database Systems, Addition Wiley.

Reference Books:

1. Bipin Desai, An Introduction to Database Systems, Galgotia Publications, 1991.

SECOND SEMESTER							
S. NO.	**CODE**	**SUBJECT**	**Category**	**L**	**T**	**P**	**C**
1	**CSL 611**	**Data Structures**	**DC**	**3**	**1**	**0**	**4**
2	**CSL 424**	**Data Communication and Computer Networks**	**DC**	**3**	**1**	**0**	**4**
3	**CSL716**	**Discrete Mathematics**	**DC**	**3**	**1**	**0**	**4**
4	**CSL 761**	**Computer Organization and Architecture**	**DC**	**3**	**1**	**0**	**4**
5	**CSL 442**	**Web Technology**	**DC**	**3**	**1**	**4**	**6**
6	**CSP 320**	**Data Structures Lab**	**DC**	**0**	**0**	**4**	**2**

CSL-611 DATA STRUCTURES

4 Credits (3-1-0)

Unit I:

Introduction:

Basic Terminology, Elementary Data Organization, Data Structure operations, Algorithm, Design and analysis, Complexity and Time-Space trade-off.

Arrays: Array Definition, Representation and Analysis, Single and Multidimensional Arrays, address calculation, application of arrays, Character String in C, Character string operation.

Unit II:

Stacks:

Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Linked Representation of Stack, Operations Associated with Stacks, and Application of stack: Conversion of Infix to prefix and Postfix Expressions, Evaluation of postfix expression using Stack.

Queues: Array and linked representation and implementation of queues, Operations on Queue: Create Add, Delete, and Circular queue.

Unit III:

Linked list: Representation and Implementation of Singly Linked Lists, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists, Insertion and deletion Algorithms, Doubly linked list, Linked List v/s Array.

Unit IV:

Sorting: Bubble Sort, Selection Sort Insertion Sort, Quick Sort, Merge Sort, and Heap Sort.

Searching: Sequential search, Binary search.

Graph: Edges and Vertices, Representation of graph, Adjacency Matrix, Incidence Matrix, BFS, BFS, Shortest Path Algorithms

Unit V:

Trees:

Basic terminology, Binary Trees, Binary tree representation, algebraic Expressions, Complete Binary Tree, Array and Linked Representation of Binary trees, Traversing Binary tree, Binary Search Trees.

Text Books:

1. Lipschutz, *Data Structure*, Tata McGraw Hill.
2. Tenenbaumet. al A.M., *Data Structures Using C & C++*, Prentice Hall of India.
3. KanitkarYashwant, *Data Structure Using C*, BPB.
4. Salaria R.S., *Data Structure Using C*, Khanna Publishers.

Reference Books:

1. Horowitz and Sahani, *Fundamentals of Data Structures*, Galgotia.
2. Kruse et.al R., *Data Structures and Program Design in C*, Pearson Education.
3. Cormen T. H., *Introduction to Algorithms*, Prentice Hall of India.

CSL16 DISCRETE MATHEMATICS
4 credits (3-1-0)

Unit-1: Number Systems
Decimal Number Systems, Binary Number Systems, Hexadecimal Number Systems, Octal Number Systems and Binary arithmetic

Propositions and Logical Operations: Notation, Connections, Normal forms, Truth tables, Equivalence and Implications, Theory of inference for statement calculus, Predicate calculus, Rules of Logic and Mathematical Induction and Quantifiers

Unit-2: Sets, Relations and Diagraphs
Review of set concepts, Relations and digraphs, Properties of relations, Equivalence relations, Computer representation of relations and digraphs, Manipulation of relations, Partially Ordered Sets (Posets).

Unit-3: Recurrence Relations
Towers of Hanoi, Iterations, Homogeneous linear equations with constant coefficients, particular solution, difference table, finite order differences, Line in a plane in general position

Unit-4: Groups and applications
Monoids, semi groups ,Product and quotients of algebraic structures, Isomorphism, homomorphism, automorphism, Normal subgroups, Codes and group codes.

Unit-5: Classification of Languages, Overview of Formal Languages: Representation of regular languages and grammars, finite state machines

Reference Books:

1. Discrete Mathematical Structures, Tremblay and Manohar, Tata McGraw Hill
2. Discrete Mathematics, 1st edition by Maggard, Thomson
3. Discrete Mathematics, SemyourLipschutz, VarshaPatilIInd Edition Schaum's Series TMH
4. Discrete Mathematical Structures, Kolman, Busby and Ross, Prentice Hall India, Edition 3

CSL 424 Data Communication & Computer Networks
4 Credits (3-1-0)

Unit 1
Data Communications
Introduction, Communication Systems, Signal and data, Transmission modes, Synchronous and synchronous transmission, Circuits, channels and multichanneling, Signaling, Encoding and decoding, Error detection and Recovery, Flow control, Sliding Window, Congestion Management, Multiplexing [FDM, TDM, CDM, WDM] and Spreading [DS. FH], Concept of Modulation, Baseband versus Broadband; Pulse Code Modulation (PCM), Shift Keying [ASK, FSK, PSK, QPSK, DPSK]; Encoding techniques and CODEC; Classification of Modems, Standards and Protocols, Protocols used by Modem to Transfer files, Establishing a Connection (Internet connectivity); Digital Subscriber Loop (DSL)

Unit 2
Communication Network Fundamentals
Introduction, Switching techniques: Circuit Switching, Packet switching, Datagram, Virtual circuit and Permanent Virtual Circuit, Connectionless and connection oriented communication, Message switching, Cell switching (ATM); Telephone network signaling Network topologies, Layering the communication process, Open Systems Interconnection (OSI) model, Data encapsulation; Protocols, services and layering, PDU/SDU; TCP/IP suite, Hour-glass model, Internet Architecture and Protocol overview.

Unit 3
Media Access Control
Introduction, Access Techniques (STDM, FDMA, TDMA, Spread Spectrum techniques and CDMA, DSSS, FHSS); Media Access Control: Aloha and Slotted Aloha, Media Access Control Address, Polling, CSMA, CSMA/CA, CSMA/CD and Reservation Aloha, Digital hierarchies [SONET/SDH]
Network Components
Introduction, LAN Hardware, LAN Operating Systems, Transmission Media: Guided Media (Twisted pair, Co-axial cable, Optical fiber); Unguided Media (Radio, VHF, microwave, satellite, Infrared); Fiber Optics Communication Components (Source, Channel Detector.

Unit 4
Link Control and MAC Protocols

Framing, Error Detection and Correction; Window-based Flow Control; Logical Link Control, HDLC Protocol, Point-to-Point Protocol (PPP), X.25 CCITT standard for packet data transmission; Media access control, Random Access Techniques, Scheduling Mechanisms.

Local Area Network (LAN)

LAN topologies and protocols; IEEE 802 Standard; Ethernet (Standard, Fast, Gigabit), Token Ring, FDDI, Wireless LANs (802.11x); Connecting LANs: Repeaters, Bridges, Switches, Routers; Virtual LANs

Unit 5

Wide Area Network (WAN)

Network Layer Addressing and Routing concepts (Forwarding Function, Filtering Function); Routing Methods (Static and dynamic routing, Distributed routing, Hierarchical Routing); Distance Vector Protocol, Link State protocol, Open Shortest Path First (OSPF); Internet Protocol (IP): Addressing & Routing; Internet Control Message Protocol, (ICMP), Address Resolution Protocol (ARP), Dynamic Host Control Protocol (DHCP), Network Address Translation (NAT), IPv6, Mobile IP Process-to-Process delivery in Transport Layer: User Datagram Protocol (UDP), Transmission Control Protocol (TCP), congestion control

Wireless Networks

Radio Communications, Cellular Radio, Mobile Telephony (GSM & CDMA), Satellite Networks (VSAT), Mobile Adhoc Networks (MANET).

Security and Management

Cryptography, IPsec, SSL/TLS, PGP, secure HTTP, proxy, firewall, VPN; Simple Network Management Protocol (SNMP), Network policies.

Text Books:

1. Behrouz A Forouzan, "Data Communication and Networking", Tata McGraw-Hill, 2008
2. William Stallings, "Data and Computer Communications", Pearson Education, 2008.
3. Tomasi Wayne, "Introduction to Data Communications and Networking", Pearson Education, 2007.

ReferenceBooks:

1. A. S. Tanenbaum, "Computer Networks", Fourth Edition, Pearson Education.
2. A. Leon-Gracia and I. Widjaja, "Communication Networks", Tata McGraw Hill, 2004.
3. K. Pahlavan and P. Krishnamurthy, "Principles of Wireless Networks", EEE/ Prentice Hall of India, 2003.

CSL 442 Web Technology

6 Credits (3-1-4)

Unit-1:

Introduction to PHP, Installation and configuration of LAMP on Linux & Windows, Importance of php.ini file and httpd. conf file, PHP echo & print, PHP Variables, PHP Constant, PHP Operators, Conditional Statements, if, PHP If...Else, nested if... else.., PHP Switch, PHP Looping, PHP Global arrays $_SERVER , $_POST , $_GET , $_POST , $_REQUEST , $_SESSION , $_COOKIE)

Unit-2:

PHP & HTML Form

HTML Form, HTML Control Text box, Button, Checkbox, Radio Button, List Box, Drop down list Box, Image, File Upload

PHP $_GET, PHP $_POST. PHP Functions Built in functions and user defined function. Exception handling, require (), include()

Unit-3:

Introduction to MYSSQLi, Creating Database & Tables, Import & Export data, Backup & Restore Data, Database connectivity, MySQL Connect, MySQL Create, MySQL Insert, MySQL Select , MySQL Select with limit, MySQL Where, MySQL Order By, MySQL Update, MySQL Delete, Handling multimedia data (sound, Image, Video),Display Parent Child Data.

Unit-4:

PHP Session, Creating Session, Reading & Writing Session, Session related functions session_start() , session_id() , isset() session_regenerate_id() session_destroy() unset(),Handing Form with Session.

PHP Cookies, Understand the difference between session and cookie, Initialization of cookie variable, setcookie() function Cookie properties, Setting a cookie in PHP, Retrieving PHP cookies Expiring/Deleting PHP cookies, Sending Email, Uploading files.

Unit-5:

Introduction to Word Press and its usages ,Word Press Installation, A Quick Tour of Word Press Dashboard and its working interface, Building a Website using with Word Press Dashboard and Theme, Installation of Plugin and Themes with Word Press and Making Navigation and Page, Using Word Press Plugin SEO,Contact Form, Social Plugins, Post & Pages,Uploading Web site on Web Server.

Text Books:
1. Burdman, *Collaborative Web Development*, Addison Wesley.
2. Bayross Ivan, *Web Technologies Part II*, BPB Publications.

Reference Books:
1. GundavarmaShishir, *CGI Programming on the World Wide Web*, O'Reilly & Associate.
2. DON Box, *Essential COM*, Addison Wesley.
3. Mick Olinik & Raena Jackson Armitage, The Word Press Anthology ,site point

CSL761 Computer Organisation And Architecture

4 credits (3-1-0)

Unit-1: Digital Logic
Boolean Algebra,Gates, Combinational Circuits, Implementation of Boolean Functions, Algebraic Simplification, Karnaugh maps, Multiplexers / Demultiplexers, Decodes / Encodes, Adders : Half, Full, Sequential Circuits, Flips-Flops: S-R, J-K, D , Registers: Parallel, Shift Counters: Ripple, Synchronous

Unit-2: The Computer System
Computer function and Interconnection, Computer functions, Interconnection Structures, Bus Interconnection, Memory system design, Memory hierarchy and SRAM, Advanced DRAM Organisation, Interleaved memory, Associative memory, Nonvolatile memory, RAID, Cache memory, Cache memory Principles, Elements of cache design, Improving Cache Performance, Input/Output, External devices, I/O modules, Programmed I/O, Interrupt-driven I/O, Direct Memory Access, I/O Channels and Processors.

UNIT 3: Central Processing Unit
Instruction set: characteristics & functions, Machine Instruction characteristics, Type of Operands, Types of Operations, Instruction set: addressing modes & formats, Addressing, Instruction Formats, CPU structure and Function, Processor Organization, Register Organization, Instruction cycle, Instruction Pipelining, RISC, Instruction Level Parallelism and Superscalar Processors, Superscalar versus super pipelined, Limitations, Instruction level parallelism and machine parallelism, Instruction issue policy, Register Renaming, Branch Prediction, Superscalar Execution, Superscalar Implementation.

UNIT 4: Control Unit
Control Unit Operation, Micro-operation, Control of the processor, Hardwired Implementation, Microprogrammed Control, Basic Concepts.

UNIT 5: Parallel Organization
Microprocessor organizations, Types of parallel Processor Systems, Parallel organizations, Symmetric Multiprocessors, Organization Clusters, Cluster Configurations, Cluster computer Architecture

Text Books:
1. Digital Computer Fundamentals, BarteeC.Thomas, McGraw-Hill International Edition
2. Computer Organisation and Architecture; Stallings, W Prentice Hall of India, New Delhi

Reference Books:
1. Computer Architecture by Nicolas Carter, Schaum's outlines, McGraw-Hill
2. Advance Computer Architecture 2nd Edition by Parthsarthy, Thomson
3. Computer Organisation by Hamacher C, Zaky S. McGraw Hill
4. Computer Architecture, Behrooz Parhami, Oxford University Press

THIRD SEMESTER							
S. NO.	**CODE**	**SUBJECT**	**Category**	**L**	**T**	**P**	**C**
1	**CSL-545**	**Enterprise Resource Planning**	**DC**	**3**	**1**	**0**	**4**
2	**CSL-770**	**E-Commerce**	**DC**	**3**	**1**	**0**	**4**
3	**CSL 817**	**ASP .Net with C#**	**HU**	**3**	**0**	**2**	**4**
4	**CSL 712**	**Internet and Java Programming**	**DC**	**3**	**1**	**0**	**4**
5	**CSL-771**	**Cloud Computing**	**DC**	**4**	**0**	**0**	**4**
6	**CSL-759**	**Cryptography and Computer Security**	**DC**	**3**	**1**	**0**	**4**
7	**CSP 781**	**Java Lab**	**DC**	**0**	**0**	**2**	**1**
8	**CSD-740**	**Seminar - Research Paper**	**DC**	**0**	**1**	**2**	**2**

CSL-759 Cryptography and Network Security
4 credits (4-0-0)

Unit-1:
Network Security: Attacks; Services & Mechanisms; Conventional Encryption: Classical Encryption Techniques, Model and Steganography.

Unit-2:
Encryption Schemes: DES: Standard, Strength; Block Cipher Design Principles; Block Cipher Modes of Operation: Triples DES; Placement & Encryption Function: Key Distribution, Random Number Generation, Placement of Encryption Function.

Unit-3:
Public-Key Cryptography: Principles; RSA Algorithm; Key Management; Fermat's & Euler's Theorems; Primarily Miller Test; Chinese Remainder Theorem.

Unit-4:
Message Authentication & Hash Functions: Authentication: Requirements, Protocol, Functions, Message Authentication Codes, Hash Functions, Birthday Attacks, Security Of Hash Function & MACS, MD5 Message Digest Algorithm, Secure Hash Algorithm (SHA)

Digital Signatures: Digital Signature Standard (DSS), Proof of Digital Signature Algorithm.

Unit-5:
IP Security: Electronic Mail Security; Pretty Good Privacy (PGP); S/MIME; Authentication Header; Encapsulating Security Payloads; Combining Security Associations; Key Management,.

Web Security: Secure Socket Layer & Transport Layer Security, Secure Electronic Transaction (Set);

System Security: Intruders; Viruses; Firewall Design Principles; Trusted Systems.

Text Book
1. Stallings, W., Cryptography and Network Security: Principles and Practice, Prentice Hall.
2. Kahate, A., Cryptography and Network Security, Tata McGraw Hill.

Reference Book
1. Johannes, A. B., Introduction to Cryptography, Springer.

CSL-545 Enterprise Resource Planning
4 credits (4-0-0)

Unit-1:

ERP Introduction, Benefits, Origin, Evolution and Structure: Conceptual Model of ERP, The Evolution of ERP, The Structure of ERP.

Unit-2:
Business Process Reengineering, Data ware Housing, Data Mining, Online Analytic Processing (OLAP), Product Life Cycle Management (PLM),LAP, Supply chain Management.

Unit-3:
ERP Marketplace and Marketplace Dynamics: Market Overview, Marketplace Dynamics, The Changing ERP Market. ERP-Functional Modules: Introduction, Functional Modules of ERP Software, Integration of ERP, Supply chain and Customer Relationship Applications.

Unit-4:
ERP Implementation Basics, ERP Implementation Life Cycle, Role of SDLC/SSAD, Object Oriented Architecture, Consultants, Vendors and Employees.

Unit-5:
ERP & E-Commerce, Future Directives- in ERP, ERP and Internet, Critical success and failure factors, Integrating ERP into organizational culture.

Using ERP tool: either SAP or ORACLE format to case study.

Text Books:
1. A. Lexis Leon, "Enterprise Resource Planning", TMH
2. Brady, Manu, Wegner, "Enterprise Resource Planning", TMH

Reference Books:
1. Vinod Kumar Garg and Venkitakrishnan N K, "Enterprise Resource Planning – Concepts and Practice", PHI
2. Joseph A Brady, Ellen F Monk, Bret Wagner, "Concepts in Enterprise Resource Planning", Thompson Course Technology

CSL-770 E-COMMERCE

4 credits (4-0-0)

Unit-1:
Introduction: Electronic Commerce - Technology and Prospects, Definition of E- Commerce, Economic potential of electronic commerce, Incentives for engaging in electronic commerce, forces behind E-Commerce, Advantages and Disadvantages, Architectural framework, Impact of Ecommerce on business.

Network Infrastructure for E- Commerce: Internet and Intranet based Ecommerce- Issues, problems and prospects, Network Infrastructure, Network Access Equipments, Broadband telecommunication (ATM, ISDN, and FRAME RELAY).

Unit-2:
Mobile Commerce: Introduction, Wireless Application Protocol, WAP technology, Mobile Information device, Mobile Computing Applications.

Unit-3:
Web Security: Security Issues on web, Importance of Firewall, components of Firewall, Transaction security, Emerging client server, Security Threats, Network Security, Factors to consider in Firewall design, Limitation of Firewalls.

Unit-4:
Encryption: Encryption techniques, Symmetric Encryption- Keys and data encryption standard, triple encryption, Asymmetric encryption- Secret key encryption, public and private pair key encryption, Digital Signatures, Virtual Private Network.

Unit-5:
Electronic Payments: Overview, The SET protocol, Payment Gateway, certificate, digital Tokens, Smart card, credit card, magnetic strip card, E-Checks, Credit/Debit card based EPS, online Banking.

EDI Application in business, E- Commerce Law, Forms of Agreement, Govt. policies and Agenda

Text Books:
1. Frontiers of Electronic Commerce, By- Kalakota, Ravi ; Stone, Tom ; Whinston, Andrew B, Addison Wesley Publishing Co , ISBN 8178080575
2. E-Commerce An Indian Perspective (Second Edition) – by P.T. Joseph, S.J. Prentice-Hall of India

CSL-712 Internet and Java Programming
4 credits (3-1-0)

Unit-I
Core Java:
Introduction, Operator, Data type, Variable, Arrays, Control Statements, Methods & Classes, Inheritance, Package and Interface, Exception Handling, Multithread programming, I/O

Unit-II
Java Applet, String handling, Networking, Event handling, Introduction to AWT, AWT controls, Layout managers, Menus, Images, Graphics.

Unit-III
Java Swing:
Creating a Swing Applet and Application, Programming using Panes, Pluggable Look and feel, Labels, Text fields, Buttons, Toggle buttons, Checkboxes, Radio Buttons, View ports, Scroll Panes, Scroll Bars, Lists, Combo box, Progress Bar, Menus and Toolbars, Layered Panes, Tabbed Panes, Split Panes, Layouts, Windows, Dialog Boxes, Inner frame.

Unit-IV
JDBC:
The connectivity Model, JDBC/ODBC Bridge, java.sql package, connectivity to remote database, navigating through multiple rows retrieved from a database. EJB: Session Beans, Entity Beans, Introduction to Enterprise Java beans (EJB), Introduction to RMI (Remote Method Invocation), A simple client-server application using RMI.

Unit-V
Java Servlets:
Servlet basics, Servlet API basic, Life cycle of a Servlet, Running Servlet, Debugging Servlets, Thread-safe Servlets, HTTP Redirects, Cookies, Introduction to Java Server Pages (JSP).

Text Books:
1. Margaret Levine Young, "The Complete Reference Internet", TMH
2. Naughton, Schildt, "The Complete Reference JAVA2", TMH

Reference Books:
1. Balagurusamy E, "Programming in JAVA", TMH
2. Dustin R. Callway, "Inside Servlets", Addison Wesley
3. Mark Wutica, "Java Enterprise Edition", QUE
4. Steven Holzner, "Java2 Black book", Dreamtech

CSL-772 Cloud Computing
4 credits (4-0-0)

Unit I
Cloud Computing: Existing usage of cloud computing; New paradigm in the cloud; Applications. Cloud Computing Architectural Framework: Cloud: Benefits, Vocabulary, Business scenarios, Essential characteristics, Deployment models, Service models, Multi-tenancy, Approaches to create a barrier between the tenants.

Unit II
Vendor Lock-in and Efforts at Standardization: Need of migration; Preventing vendor locking, Comparison chart., Data Center Operations: The anatomy of cloud infrastructure, Data Center Operations, Security challenge, implements "Five Principal Characteristics of Cloud Computing, Data center Security Recommendations. Introducing Identity Services, Enterprise Architecture with IDaaS , IDaaS Security Recommendations, data Security in Cloud, technologies for data security.

Unit III
Governance and Enterprise Risk Management: Information security governance processes, Governance and enterprise risk management in Cloud Computing, Governance Recommendations, Enterprise Risk Management Recommendations, Information Risk Management Recommendations and Third Party Management Recommendations

Unit IV

Cloud Reliability, Fault Tolerance and Response Time: Business continuity management: System reliability, Case studies on designing for reliability; Concept of fault tolerance; Response time. Internet Cloud Security: Introduction; Potential threats; Security as a service by cloud providers; Fraud theory and Intellectual property.
Information Lifecycle Management: Key challenges regarding data lifecycle security, Data Security Recommendations by Cloud Computing

Unit V
Traditional Security, Business Continuity, and Disaster Recovery: Risk of insider abuse, Security baseline, Customers actions, Contract, Documentation, Recovery Time Objectives (RTOs), Customers responsibility Case Studies : Amazon's cloud services (AWS)

Text Books:
1. David, E.Y. Sarna, *Implementing and Developing Cloud Computing Applications*, CRC Press.
2. Dimitris, N. Chorafas, *Cloud Computing Strategies, C*RC Press.
3. Rajkumar Buyya, James Broberg, Andrzej M. Goscinsk, Cloud Computing: Principles and Paradigms, Wiley Publications

Reference Books:
1 Mather, T., *Cloud Security and Privacy: An Enterprise Perspective On Risks And Compliance,* O'Relly'

CSL-817 ASP .Net with C#

4 credits (3-0-2)

Unit—I
Architecture of the .Net Framework Development Platform: Compiling Source Code into Managed Code, Metadata, Intermediate Language (IL), Common Language Runtime Services, Common Type System, Common Language Specification The .Net Framework Class Library, Just-In-Time Compilation, Unified Classes.
C# Basics: Data Types, Literals and Variables, Operator, Program Control Statements, Class and Object, Arrays and Strings,
A Closer Look at Methods and Classes: C# Access Modifiers, Use ref and out parameter, Variable number of Arguments, Concept of Return Object and Array. Method Overloading, Overloading Constructors, Optional Arguments, Named Arguments, Recursion, Understanding Static.

Unit—II
Operator Overloading, Indexers and Properties, **Inheritance :** Member Access using Protected Access, Calling Base Class Constructor, Name Hiding, Virtual Methods and Overriding, Abstract Classes, Using sealed to Prevent Inheritance, Boxing and Unboxing. Interfaces, Exception Handling. Using I/O.

Unit-III
Delegates and Events, Namespaces and Assemblies, Reflection, Unsafe Code, Networking and Socket. **Multithreading :** Thread Class, Determining when a Thread Ends, Thread Priorities, Synchronization, Thread Communication using Wait(), Pulse() and PulseAll(), Using the Mutex and a Semaphore. Collections. Windows Forms (IDE Environment)

Unit—IV
Advanced Features Using C#: Windows Services, Web Services.
Introduction to ADO.Net: Connected v/s. Disconnected Data Access. ADO.Net Architecture, Connection Object, SQL Command Object, Data Adapter, Data Reader, DataSet.

Asp.net Web Form Controls. State Management, Grid View Control, Validation Controls. Programming Configuration Files, Encrypting Configuration Sections Themes and Master Pages Creating a Consistent Web Site, ASP.NET Themes , Master Pages, Concepts of Paging, Database connectivity with authentication and authorization.

Unit—V
Advanced Features Using C#: ManagingState : Preserving State in Web Applications ,Page-Level State , Using Cookies to Preserve State , ASP.NET Session State , Storing Objects in Session State , Configuring Session State , Setting Up an Out-of-Process State Server , Storing Session State in SQL Server , Using Cookieless Session IDs , Application State Using the DataList and Repeater Controls , Overview of List-Bound Controls |Creating a Repeater Control Distributed Application in C#, Graphical Device interface with C#,
Enumeration.

Text books:

1. Wiley," Beginning Visual C# 2008", Wrox
2. ".Net professional framework 4.0", Wrox
3. "Black Book .Net Framework 4.0". DreamTech
4. "C# 4.0 Complete Reference", by Herbert Schildt
5. "Professional ASP.NET 4.5 in C# and VB" by Bill Evjen, Scott Hanselman, Devin Rader, Wrox

Reference Books:

1. C#.Net Developers Guide- Greg Hack, Jason Werry, SaurabhNandu. (SyngRess)

FOURTH SEMESTER							
S. NO.	**CODE**	**SUBJECT**	**Category**	**L**	**T**	**P**	**C**
1	**CSL-615**	**Hybrid Mobile Application**	**DC**	**3**	**0**	**2**	**4**
2	**CSL-818**	**Unix and Shell Programming**	**DC**	**3**	**0**	**2**	**4**
3	**CSL 671**	**AI & Expert Systems**	**DC**	**3**	**1**	**0**	**4**
4	**CSL 813**	**Programming with Python**	**DC**	**3**	**0**	**2**	**4**
5	**CSL 815**	**Ethical Hacking**	**DC**	**3**	**1**	**0**	**4**
6	**CSL-608**	**Data Ware Hose and Data Mining**	**DC**	**3**	**1**	**0**	**4**
7	**CSD 855**	**Major project**	**DC**	**0**	**0**	**0**	**4**

CSL 671 AI & EXPERT SYSTEMS

4 Credits (3-1-0)

Unit I

General Issues and overview of AI:

The AI problems: what is an AI technique; Characteristics of AI applications Problem Solving, Search and Control Strategies General Problem solving; Production systems; Control strategies; forward and backward chaining Exhaustive searches: Depth first Breadth first search.

Unit II

Heuristic Search Techniques:

Hill climbing; Branch and Bound technique; Best first search and A* algorithm; AND/OR Graphs; Problem reduction and AO* algorithm; Constraint Satisfaction problems Game Playing Min Max Search procedure; Alpha-Beta cutoff; Additional Refinements.

Unit III

Knowledge Representation:

First Order Predicate Calculus; Skolemnisation; Resolution Principle and Unification; Inference Mechanisms Horn's Clauses; Semantic Networks; Frame Systems and Value Inheritance; Scripts; Conceptual Dependency AI Programming Languages Introduction to LISP, Syntax and Numeric Function; List manipulation functions; Iteration and Recursion; Property list and Arrays, Introduction to PROLOG.

Unit IV

Natural Language Processing and Parsing Techniques :

Context – Free Grammar; Recursive Transition Nets (RTN); Augmented Transition Nets (ATN); Semantic Analysis, Case and Logic Grammars; Planning Overview – An Example Domain: The Blocks Word; Component of Planning Systems; Goal Stack Planning (linear planning); Non-linear Planning using constraint posting; Probabilistic Reasoning and Uncertainty; Probability theory; Bayes Theorem and Bayesian networks; Certainty Factor.

Unit V

Expert Systems:

Introduction to Expert Systems, Architecture of Expert Systems; Expert System Shells; Knowledge Acquisition; Expert system development life cycle: Problem selection, Prototype construction, Formalization, Implementation, Evaluation, Knowledge acquisition: Knowledge engineer, Cognitive behavior, Acquisition techniques, Knowledge representation: Level of representation, Knowledge representation schemes, Formal logic, Inference Engine, Semantic net, Frame, Scripts

Fuzzy logic : Definition, Difference between Boolean and Fuzzy logic, fuzzy subset, fuzzy membership function, fuzzy expert system, Inference process for fuzzy expert system, fuzzy controller.

Text Books

1. Elaine Rich and Kevin Knight: Artificial Intelligence – Tata McGraw Hill.
2. Dan W.Patterson, Introduction to Artificial Intelligence and Expert Systems – Prentice Hal of India.

Reference Books

1. Nils J. Nilsson: Principles of Artificial Intelligence – Narosa Publication house.
2. Artificial Intelligence : A Modern Approach, Stuart Rusell, Peter Norving, Pearson Education 2nd Edition.

3. Artificial Intelligence, Winston, Patrick, Henry, Pearson Education.
4. Artificial Intelligence by Gopal Krishna, Janakiraman.

CSL 815 Ethical Hacking
4 Credits (3-1-0)

Unit I:
Introduction to Ethical Hacking: Understanding the importance of security, Concept of ethical hacking and essential Terminologies-Threat, Attack, Vulnerabilities, Target of Evaluation, Exploit. Hacking Methodology, Process of Malicious Hacking, Phases involved in hacking and Foot printing and scanning: Foot printing : Introduction to foot printing, Understanding the information gathering methodology of the hackers,Tools used for the reconnaissance phase , scanning. Enumeration: Enumeration. System Hacking and Trojans: System Hacking, Trojans and Black Box Vs. White Box Techniques

Unit II :
Hacking Methodology: Denial of Service, Sniffers: Understanding Sniffers ,Comprehending Active and Passive Sniffing, ARP Spoofing and Redirection, DNS and IP Sniffing, HTTPS Sniffing, Session Hijacking and Hacking Web Servers: Understanding Session Hijacking, Phases involved in Session Hijacking, Types of Session Hijacking, Session Hijacking Tools, Hacking Web Servers. Web Application Vulnerabilities and Web Techniques Based Password Cracking: Web Application Vulnerabilities, Web Application Threats, Web Based Password Cracking Techniques, Web Application Hacking, Cross Site Scripting / XSS Flaws / Countermeasures Correct Web Application Set-up

Unit III:
Web and Network Hacking: SQL Injection Attacking SQL Servers, Sniffing, Brute Forcing and finding Application Configuration Files, Input validation attacks. Preventive Measures, Hacking Wireless Networking, Viruses, Worms and Physical Security: Viruses and Worms, Physical Security. Linux Hacking: Linux Hacking. Evading IDS and Firewalls: Evading IDS and Firewalls. Demonstration of vulnerabilities and Mitigation of issues identified including tracking.

Unit IV:
Report writing & Mitigation: Introduction to Report Writing & Mitigation, requirements for low level reporting & high level reporting of Penetration testing results,

Unit V:
Ethical Hacking Laws and Tests : An introduction to the particular legal, professional and ethical issues likely to face the domain of ethical hacking, ethical responsibilities, professional integrity and making appropriate use of the tools and techniques associated with ethical hacking – Social Engineering, Host Reconnaissance.

Text Books:
1. Michael T. Simpson, Kent Backman, James E. "Corley, Hands-On Ethical Hacking and Nework Defense", Second Edition, CENGAGE Course.
2. The CEH Prep Guide: The Comprehensive Guide to Certified Ethical Hacking, by Ronald L. Kurtz (Author), Russell Dean Vines, Wiley Publications, First Edition
3. Rajat Khare, "Network Seuciryt and Ethical Hacking", Luniver Press, 2006

Reference Books:
1. Steven DeFino, Barry Kaufman, Nick Valenteen, "Official Certified Ethical Hacker Review Guide", CENGAGE Course.
2. Patrick Engebretson, "The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy", Syngress Basics Series – Elsevier.
3. Whitaker & Newman, " Penetration Testing and Network Defense" , Cisco Press, Indianapolis.

CSL-818 Unix & Shell Programming
4 Credits (3-1-2)

Unit – I

Overview of Linux:
Introduction to operating system, features and roles, Open Source advantages, Introducing Linux as operating system, Exploring Linux distributions, Architecture of Linux, types of shell, File System, File management- types of files, absolute and relative paths, reference directories, looking for files in the file system, Boot process and Linux loaders, Linux Graphical Environments – X Window system, GNOME and KDE desktop.

Unit - II
Linux Commands:

Basic Commands, Internal and External Commands, Managing File Permissions, Locating files, Common filter commands, Using MAIL, Host Information, Daemons and Clocks, Printing and Networking Commands, Process Management- components of process, life cycle, parent-child relationship, monitor process, signals, scheduling priority, process states, Periodic process and System variables.
Shell Meta Characters: Filename Substitution Meta characters, Redirection Meta characters, Process Execution Meta characters, Conditional Execution Using && and ||, Quoting Meta characters, Positional Parameters and Special Parameters.

Unit - III
Linux Editor:
Introducing vim: A Modal Editor, modes of vim, status line commands, Opening & modifying a file, Saving a file and exiting vim, Search and Replace, undoing changes, yanking, Accessing multiple files, Window Commands, Interacting with system, Macros, vim configuration. Ex basics, syntax of ex commands, Addresses, Address symbols, options.
sed Editor: overview, uses of sed, sed operation, standard operations, pattern addressing, regular expressions, line information, I/O processing, yanking, putting, branching commands, multiline input processing.

Unit - IV
Linux Programming:
Bash scripting: Variables- variable assignment and variable scope, Operators, Command Line Arguments, Setting Values of Positional Parameters, Using Shifton Positional Parameters, Control Flow Statements-Decision, loops and case statements, Arithmetic in Shell Script, Array, File and String Tests.
gawk programming: overview, command line syntax, standard options, Built in variables, operators, variable and array assignment, escape sequences, patterns and procedures, functions,
file inclusion, output redirections, printf formats.

Unit - V
Linux Basic administration: System administrator roles and responsibilities, user account management, monitoring system performance, configuring hardware, Managing File Systems, using su, sudo, sticky bits, using configuration and log files, maintaining effective data backup strategy, managing run levels, using graphical administration tools, managing security – using password protection, using shadow password file, using log files, using secure shell tools – ssh, sftp, scp.

Text Books:
1. Sumitaba Das, Unix Shell Programming, TMH
2. Ellen Siever, Linux in a nutshell, O'REILLY
3. Christopher Negus, Linux Bible, edition-2011
Reference Books:
1. Evi Nemeth, Unix and Linux System Administration hand book, pearson
2. MachteltGarrels, Introduction to Linux

CSL-608 Data Warehouse and Data Mining
4 Credits (3-1-0)

Unit – I
Data mining:
Introduction, Data mining – on what kind of data, data mining functionalities –what kind of patterns to be mined, Classification of data mining systems, data mining task primitives, integration of a data mining systems with a database or data warehouse systems, major issues in data mining.

Unit – II
Data preprocessing:
Descriptive data summarization, data cleaning, data integration and transformation, data reduction, data descretization and concept hierarchy generation. Data warehouse and OLAP technology: What is data warehouse, A multidimensional data model, data warehouse architecture, data warehouse implementation, data warehouse usage, OLAP, OLAM
Unit – III

Mining frequent patterns, association and correlation, efficient and scalable frequent item set mining methods, From association mining to correlation analysis. Classification: Introduction, issues, classification by decision tree induction, rule based classification, classification by back propagation, lazy learners, other classification methods,

Unit – IV
Prediction:
Accuracy and error measures, evaluating the accuracy of a classifier or predictor.

Cluster Analysis:
Types of data in cluster analysis, a categorization of major clustering methods, partitioning methods.

Unit – V
Mining complex types of data: Multidimensional analysis and descriptive mining of complex data objects, mining spatial database, multimedia database, mining World Wide Web., Applications and trends in data mining: Data mining applications, data mining system products and research prototypes, social impact of data mining, trends in data mining.

Text Books:
1. Kamber and Han, "Data Mining Concepts and Techniques", Hartcourt India P. Ltd., 2001.
2. Paul Raj Poonia, "Fundamentals of Data Warehousing", John Wiley & Sons, 2003.

Reference Books:
1. Margaret Dunham, " Data Mining: Introductory and Advanced Topics, 1/e", Pearson
2. G. K. Gupta, "Introduction to Data Mining with Case Studies", PHI, 2006.
3. W. H. Inmon, "Building the Operational Data Store",2nd Ed., John Wiley, 1999

CSL 813 Programming with Python
4 Credits (3-0-2)

Unit-I
Introduction History, Features, Setting up path, Working with Python, Basic Syntax ,Variable and Data Types , Operator Conditional Statements If ,If- else ,Nested if-else Looping For, While ,Nested loops Control Statements Break, Continue
Unit-II
String Manipulation Accessing Strings ,Basic Operations ,String slices ,Function and Methods Lists Introduction ,Accessing list ,Operations ,Working with lists ,Function and Methods Tuple Introduction ,Accessing tuples ,Operations ,Working ,Functions and Methods
Unit-III
Dictionaries Introduction, Accessing values in dictionaries ,Working with dictionaries ,Properties ,Functions Functions Defining a function , Calling a function, Types of functions ,Function Arguments ,Anonymous functions ,Global and local variables
Unit-IV
Modules Importing module ,Math module ,Random module ,Packages ,Composition InputOutput Printing on screen ,Reading data from keyboard ,Opening and closing file ,Reading and writing files ,Functions
Unit-V
Exception Handling Exception ,Exception Handling ,Except clause ,Try ? finally clause ,User Defined Exceptions OOPs concept Class and object , Attributes ,Inheritance ,Overloading ,Overriding ,Data hiding

Text Books:
1. Learning Python by Mark Lutz, David Ascher Shop O'Reilly - O'Reilly Media
2. Beginning Python Magnus Lie Hetland , Goodreads
3. Python Programming for the Absolute Beginner third edition Ross Dawson Goodreads
References:
1. Practical Programming: An introduction to Computer Science Using Python, second edition, Paul Gries, Jennifer Campbell, Jason Montojo, The Pragmatic Bookshelf.
2. Python for Informatics: Exploring Information, Charles Severance 3. Learning Python, Fourth Edition, Mark Lutz, O'Reilly publication 4. Introduction to Python for Computational Science and Engineering (A beginner's guide), Hans Fangohr,

Unit 1

Overview of Hybrid Mobile Application Introduction to Hybrid Applications, Mobility – Strategic Needs, Mobile Development Approaches, Benefits of Hybrid Applications, Value of Hybrid Applications, Challenges in Hybrid App Implementation, Power of Hybrid over Mobile Web, Architectural approaches

Unit 2

Cross Platform Mobile Application Understand how HTML5 supports the development of cross-platform applications, Code JavaScript functions, Use the form elements of HTML5, Develop simple web applications with HTML5, JavaScript, and Cascading Style Sheets (CSS), Study & comparison about Mobile Hybrid Application development framework

Unit 3

Developing a Hybrid Application Logical Architecture of a Typical Hybrid Application, Hybrid Application Design, Development & Test Considerations , UX Design and Custom Usability Guidelines , Application Performance, Security Management , Communication APIs , Local Storage and Client-side databases , Sandboxed Frames, Offline Data Management, UI/UX Testing , Security Testing , Performance Testing ,Test Automation , Development Challenges & Recommendations , Hybrid App Platforms

Unit 4

Using the ionic framework for hybrid mobile application development, Benefits of Ionic App Development, Overview of Ionic framework, Installing Ionic,Enviornment Setup, Creating the ionic application, Serving the first application, Project Structure, Understanding the role of Config.xml, Templates in Ionic, Running an Ionic App in the browser with live-reload, overview of ionic components, Header and Footer, Lists & Cards, Buttons and FABs in Ionic, Predefined Colors in Ionic, Icons in Ionic (Ionicons), Customizing Components with SCSS, Basic Interactivity with Radio buttons, Checkboxes and Selects, Loading Controller, Toast Controller, Alert Controller, Action Sheet Controller

Unit 5

Navigation within an App Creating new Pages, Page Navigation using Nav Controller, Passing Data between Pages, Lazy loading the Pages in Ionic, Modal Controller, Popover Controller, Network Basics of HTTP and APIs , Asynchronous and Synchronous Code, Understanding Observables and Promises, Using HTTP in Ionic with Http Client Module and Http Client, Making a simple GET request, Retrieving data from an API,Displaying data in the App, Ionic Native and Cordova Plugins Introduction to Ionic Native How to use an Ionic Native Module, Using the Camera Plugin,Debugging Apps with Chrome Remote Debugging, Using Relocation Plugin, Building and Publishing the App Building the App for release for Android, Creating a Key-store to Sign, Signing the App, Verifying the signed file, Upload the file to Play Store

Text Books:

1. Mahesh Panhale, Beginning Hybrid Mobile Application Development,Apress.
2. KhannaRahat, Ionic : Hybrid Mobile App Development Packt Publishing Limited

Reference Books :

1. Anton Shevchenko & Robin Van Baalen, Developing an Ionic Edge: HTML5 Cross-Platform Hybrid Apps,Bledding Edge Press
2. GokNizamettin, Building Hybrid Android Apps with Java and JavaScript OreillyPress .
3. Fu Cheng, Build Mobile Apps with Ionic 4 and Firebase: Hybrid Mobile App Development, press