SCHOOL OF COMPUTER APPLICATION

SYLLABUS & SCHEME

BCA							
FIRST SEMESTER							
S. NO.	**CODE**	**SUBJECT**	**Category**	**L**	**T**	**P**	**C**
1	CSL103	Introduction to Programming Using C & Lab	DC	3	1	4	6
2	CSL106	PC Packages & PC Software Lab	DC	3	1	4	6
3	CSL107	Fundamentals of Computers & Information Technology	DC	3	1	0	4
4	HUN106	Business Communication	HU & HM	2	0	0	2
5	MAL112	Mathematical Foundation for Computer Science	BM	3	1	0	4
6	SML101	Management Concepts	MG	3	1	0	4

CSL 103 INTRODUCTION TO PROGRAMMING USING C & LAB

6 credits (3-1-4)

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.

CSL 106 PC PACKAGES & PC SOFTWARE LAB

6 credits (3-1-4)

Unit-1: Office Packages-Office activities and their software requirement, word Processing, spreadsheet, presentation graphics, database, introduction and comparison of various office suites like MS office, Lotus Office, Star Office, Open Office etc. MS Word Basics: Introduction to MS Office; Introduction to MSWord; Features & area of use. Working with MS Word.; Menus & Commands; Toolbars & Buttons; Shortcut Menus, Wizards & Templates; Creating a New Document; Different Page Views and layouts; Applying various Text Enhancements; Working with – Styles, Text Attributes; Paragraph and Page Formatting; Text Editing using various features ; Bullets, Numbering, Auto formatting, Printing & various print options

Unit-2: Advanced Features of MS-Word: Spell Check, Thesaurus, Find & Replace; Headers & Footers; Inserting – Page Numbers, Pictures, Files, Auto texts, Symbols etc.; Working with Columns, Tabs & Indents; Creation & Working with Tables including conversion to and from text; Margins & Space management in Document; Adding References and Graphics; Mail Merge, Envelops & Mailing Labels.Inserting Caption, Citation. Referencing, Tracking Changes, Footnote, Endnote

Unit-3: MS Excel: Introduction and area of use; Working with MS Excel.; concepts of Workbook & Worksheets; Using Wizards; Various Data Types; Using different features with Data, Cell and Texts; Inserting, Removing & Resizing of Columns & Rows; Working with Data & Ranges; Different Views of Worksheets; Column Freezing, Labels, Hiding, Splitting etc.; Using different features with Data and Text; Use of Formulas, Calculations & Functions; Cell Formatting including Borders & Shading; Working with Different Chart Types; Printing of Workbook &Worksheets with various options, Macros, Pivot Table, Data Options

Unit-4: MS PowerPoint: Introduction & area of use; Working with MS PowerPoint; Creating a New Presentation; Working with Presentation; Using Wizards; Slides & its different views; Inserting, Deleting and Copying of Slides; Working with Notes, Handouts, Columns & Lists; Adding Graphics, Sounds and Movies to a Slide; Working with PowerPoint Objects; Designing & Presentation of a Slide Show; Printing Presentations, Notes, Handouts with print options.

Unit-5 :Ms-Access- Working with Database **–** Tables, Queries, Reports, Relationship and Forms, Outlook express: Setup email account with outlook, sending and receiving mail through outlook, concepts of CC and BCC, forwarding mail, Draft messages, formatting e-mail message, creating and using send and receive group emails, opening received messages, opening messages with attachment, replying to mail forwarding messages flagging for further action, setting email options, managing contacts with outlook, Setting up multiple email accounts on single machine.

Reference Book:

1. R. K. Taxali, Tata McGraw Hill.

CSL 107 FUNDAMENTALS OF COMPUTERS & INFORMATION TECHNOLOGY

4 credits (3-1-0)

Unit-1: Introduction to Number system and Codes

Logic levels and pulse wave forms, Different number systems and their conversions (Decimal, Binary, Octal, Hexadecimal), 9's and 10's complement, 1's and 2's complement, Binary Arithmetic, BCD numbers, Floating point numbers, ASCII code, Gray code. (07 Hours)

Unit-2: Boolean algebra and Gate networks

Fundamental concepts of Boolean algebra, Inverter gates, AND gate, OR gate, NAND gate, NOR gate, X-OR gate, X-NOR gate, The universal property of NAND gate and NOR gate, Basic laws of Boolean algebra, DeMorgan's theorems, Boolean expressions for gate networks (SOP and POS), Simplification of Boolean expression, Karnaugh map (SOP and POS) with examples.

Unit-3: Combinational Logic

Adders (half and full), Parallel binary adders, Look ahead carry adder, Decoder, Encoder, Multiplexer, De-multiplexer with applications.

Unit-4: Flip-Flops

Latches, Edge triggered flip-flops (SR flip-flops, D flip-flops, JK flip-flops), Pulse triggered flip-flops (Master slave JK flip-flop), Timing diagrams.

Unit-5:
Registers and Counters

Buffer registers, Modes of operation of registers (SISO, SIPO, PISO, and PIPO). Asynchronous counters (Four bit ripple counter, Decade counter), Synchronous counter (Four bit synchronous counter, Decade counter).

Memory and Introduction to Microprocessor

Classification of memory– Volatile, Non-Volatile, RAM, ROM, EPROM, E^2PROM, Basic Components of a Microprocessor (Introductory ideas).

Text Book:

1. Floyd, Thomas L: "Digital Computer Fundamentals", 3rd Edition, 1997. University Book Stall.

Reference Books:

1. Malvino, Paul Albert and Leach, Donald P: "Digital Principles and Applications"4th Edition, 2000. TMH.
2. Malvino, Paul Albert and Leach, Donald P: "Digital Computer Fundamentals" 3rd Edition, 1995. TMH.
3. Bartee, Thomas C: "Digital Computer Fundamentals" 6th Edition, 1995. TMH.

HUN 106 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. RaoNageshwar& Das R.P. – Communication skills Himalaya Publishing House, Delhi.
6. Taylor Shirley, Communication for Business, Pearson

SML 101 MANAGEMENT CONCEPTS

4 Credits (3-1-0)

Unit – 1: Management: Definition, nature, process, functions & skills. Evolution of management thoughts: Classical, Behavioral, Quantitative and Modern approaches. Business Organization - Types of ownership.

Unit – 2: Planning: Concept and purpose, Planning Process, Management by Objectives (MBO), Decision Making. Organization: Concept and purpose of organization, Types of organization , Line, Line & Staff, Matrix , Virtual Organization structures. Basis of Departmentation, Concept of Authority, Functional Authority, Delegation of Authority, Centralization and Decentralization of Authority.Coordination.Staffing.

Unit – 3: Directing: Leadership - Concept, Traits, and Styles. Communication: Concept, Types, process, barriers, making Communication effective.

Unit – 4: Controlling: Concept, process, Requirement for Adequate control Budgetary Control, Non-Budgetary Control.

Unit – 5: Business Process Re-engineering - Concept , Process, Redesign, BPR, experiences in Indian Industry Total Quality Management(TQM) - Concept , Systems model of Quality, Deming's approach, TQM as a business Strategy . Knowledge Management (KM)- What , why, how, of Knowledge Management , KM process , approach, strategies, tools.

Suggested Readings:

1. Robbins Stephen P., "Management", Pearson
2. Stoner James A.F.., "Management", Pearson

MAL 112 MATHEMATICAL FOUNDATION FOR COMPUTER SCIENCE

4 credits (3-1-0)

Unit1: Set & Functions:

Definition of sets ,Types of sets, Operations of sets, De Morgan's laws. Definition of function, Rang and Domain of Function, Types of functions, Inverse of functions, Composition of functions.

Unit2: Matrices and Determinants

Definition and Properties of Determinants, Definition and Types of Matrix, Operations of Matrix, Transpose of a Matrix, Inverse of a Matrix, Solutions of Simultaneous Linear Equations by inverse matrix.

Unit3 : Limit , Continuity and Differentiability

Introduction- Real valued functions, Limit of a Function, Algebra of limits, Continuity of a function, Properties of a continuous function, Differentiability at a point.

Unit 4 : Differential Calculus

Standard formulae, Derivative, Algebra of derivative, Differentiation of Function of a function, Logarithmic differentiation, Differentiation of Implicit functions, Differentiation of Parametric function, Mean value theorems- Roll's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's theorem, Maclaurin's theorem (Statement only).

Unit 5: Integral Calculus

Definition, Standard Results, Methods of integration, Method by Substitution, Method by Parts, Definite integrals.

Text Books:

1. Tremblay and Manohar:" Discrete Mathematical Structures with Application to computer Science". McGraw Hill Book Company.
2. Thomas and Finney:"Calculus with Analytical Geometry."
3. Erwin Keryzig:"Advanced Engineering Mathematics".

Reference Books:

1. K.D. Joshi: "Foundations of Discrete Mathematics", Wiley Eastern Ltd.
2. S. Narayan and T K ManicavachogamPillai: "Calculus," Vol I and Vol II S. V. Publishers.

BCA							
SECONDSEMESTER							
S. NO.	**CODE**	**SUBJECT**	**Category**	**L**	**T**	**P**	**C**
1	MAL 126	Algebra & Differential Equations		3	1	0	4
2	CSL 251	Internet & E-Commerce	DC	3	1	0	4
3	CSL 221	Data Structures Using C	DC	3	1	2	5
4	CSL 232	Desktop Application Using VB.Net	DC	3	1	4	6
5	CSL 241	Management Information System	MG	3	1	0	4
6	CSL279	Database Management System	DC	3	1	2	5
7	HUL 101	English In Practice	HU	2	0	2	3

MAL126-Algebra & Differential Equations

4 credits (3-1-0)

Unit-1:Algebra

Group, Subgroup,Permutation group, Ring, Subring

Unit-2: Linear algebra:

Vector space, subspace, Linear combination, linearly dependence and independence,Eigen value and Eigen vectors, bases and dimensions, Co-ordinates, linear transform, algebra of linear transformations, isomorphism, representation of transformation by matrices.

Unit-3: Sequence and series: Bounded and unbounded sequences, convergence or divergence of a sequence, behavior of monotone sequence , algebra of convergent sequence, Cauchy's sequence, Cauchy's general principle of convergence , infinite series- its convergence and sum, series with positive terms and standard tests of convergence (without proof), alternating series

Unit 4: Leibnitz test, absolute convergence , rearrangement of absolutely convergent series, test of convergence of Abel and Dirichlet (without proof)

Unit 5: Differential equation: order, degree, solution and formulation of a differential equation, First order, first degree linear diff. eg. Separation of variable, Exact diff. eg., standard techniques of solving a linear differential equation with constant coefficients.

Text Books:

1. Engineering Mathametics, Vol: 1& 2, Sastry, PHI
2. Engineering Mathematics, Arumugam, Scitech
3. Frank Ayres J R: "Differential Equation", Schaum series, TMH.

Reference Books:

1. Higher Engineering Mathematics, Vol. 2, Rathore, EPH
2. Vasishta A R: "Modern Algebra" .
3. S. Narayana& T. K. ManicavachogamPillay: "Differential Equation", SV Publishers

CSL-251 Internet& E-Commerce

4 Credits (3-1-0)

UNIT I:

Introduction To Internet Basic

The Basic of the Internet, Concepts of Domain, IP Addressing, Resolving Domain Names, Overview of TCP/IP and its Services, WWW. Internet Connectivity: level one, level two and level three connectivity, setting up a connection: hardware requirement, selection of a modem, software requirement, modem configuration,

Unit II:

Internet accounts by ISP:

Telephone line options, Protocol options, Service options, Telephone line options – Dialup connections through the telephone system, dedicated connections through the telephone system, ISDN, Protocol options – Shell, SLIP, PPP, Service options – E-mail, WWW, News Firewall etc. Internet Network definition, Common terminologies: LAN, WAN, Node, Host, Workstation, bandwidth, Interoperability, Network administrator, network security, Network Components: Severs, Clients, Communication Media, Types of network: Peer to Peer, Clients Server, Addressing in Internet: DNS, Domain Name and their organization, understanding the Internet Protocol Address. Network topologies: Bust, star and ring, Ethernet, FDDI, ATM and Intranet.

Unit –III:

Designing Pages With Html

Introduction to HTML, Essential Tags, Deprecated Tags, Tags and Attributes, Text Styles and Text Arrangements, Text, Effects, Exposure to Various Tags (DIV, MARQUEE, NOBR, DFN, HR, LISTING, Comment, IMG), Color and Background of Web Pages, Lists and their Types, Attributes of Image Tag, Hypertext, Hyperlink and Hypermedia, Links, Anchors and URLs, Links to External Documents, Different Section of a Page and Graphics, Footnote and e-Mailing, Creating Table, Frame, Form and Style Sheet.

Unit –IV:

Introduction To Java Script Vb:

Web Terminologies, Phases of Planning and Building Web Sites, The FTP, HTTP and WPP, Features, Front Page Views, Adding Pictures, Backgrounds, Links, Relating Front Page to DHTML.

Unit –V:

Internet Security Management Concepts, Information Privacy and Copyright Issues: Overview of Internet Security, Firewalls, Internet Security, Management Concepts and Information Privacy and Copyright Issues, basics of asymmetric cryptosystems

Ecommerce: Electronic Commerce - Technology and Prospects, Definition of E- Commerce, Economic

Potential of electronic commerce, Incentives for engaging in electronic commerce, forces behind Commerce, Advantages and Disadvantages, Architectural framework, Impact of Ecommerce on business.

Text Books

1. Greenlaw R and Hepp E “Fundamentals of Internet and www” 2nd EL, Tata McGrawHill, 2007.
2. Ivan Bayross, “HTML, DHTML, JavaScript, Perl CGI”, 3rd Edition, BPB Publications.
3. D. Comer, “The Internet Book”, Pearson Education, 2009.

Reference Books

1. M. L. Young,”The Complete reference to Internet”, Tata McGraw Hill, 2007.
2. Godbole AS &Kahate A, “Web Technologies”, Tata McGrawHill, 2008.
3. Jackson, “Web Technologies”, Pearson Education, 2008.
4. Leon and Leon, “Internet for Everyone”, Vikas Publishing House.

CSL-221 Data Structures Using C

5 Credits (3-1-2)

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.

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.

CSL-232 Desktop Application using VB.Net

6 credits (4-0-4)

Unit-1:

NET Framework:, Common Type System, Common , .NET class library Garbage Collection, Application installation & Assemblies.

VB.NET IDE: Start Page, Menu and Tool Bar, Toolbox, Solution Explorer, Properties Window, Task List and Output Window, Server Explorer.

Unit-2:

Variables, Constants, Keywords, Data types, Operators, Decisions with if statement, Select Case statements, Loops, Arrays.

Strings: Substring Method, Trim Method, Equals, Replace and Insert Methods, Split and Join Method, InStr Method.

Unit-3:

An Introduction to Functions and Subs, Create your own Subs , Create a Function ,Class and Objects, Create Properties in your Classes, Error Handling, Working with Textbox, Buttons, Labels, Checkbox, Radio Buttons, List box, Combo Box, Picture Box, Menu, Events: The Click Event, The Key Down Event, The Form Load Event

Unit-4:

ADO.NET: ADO.NET Data Namespaces, SqlConnection, SqlCommand, SqlDataAdapter, DataSet Class, Data View.

Unit-5:

Working with Text Files: Introduction to Text File, Open Text File, Read Text File Line by Line, Write to Text File in VB .NET, Appending Text to File, Copy File, Move File, Delete File.

Text Books:

1. Blair Richard & Crosland Jonathan,Beginning VB.NET (2 Edition), WROX
2. Steven Holzner, Visual Basic NET 2003, Pearson Education

CSL-241Management Information System

4 Credits (4-0-0)

Unit I:

An Overview of Management Information Systems: Types of information systems, Definition of a management information system, MIS & Decision Support Systems, Concept of an MIS.

Unit II:

Information System: End user and Enterprise Computing, Computer Peripherals, Application software and System software, Technical foundation of database management, managing data Resources.

Unit III:

Foundation of Information Systems in Business: Information system in business, The Components of Information system, Fundamentals of strategic advantage, Using Information for strategic advantage.

Unit IV:

Business Applications of Information Technology: Internet & Business, Intranet, Extranet &Enterprise Solutions, Information System for Managerial Decision Support.

Unit V:

Managing Information Technology: Managing Information Resources and technologies, global information technology, Security and control Issues in Information system, ethical and societal challenges of IT.

Text Books:

1. Brian O., *Management Information System*, Tata McGraw Hill
2. Brian O., *Introduction to Information System*, McGraw Hill.

References Books:

1. Murdick, *Information System for Modern Management*, PHI.
2. Jawadekar, *Management Information System*, Tata McGraw Hill.
3. Jain Sarika, *Information System*, PPM.
4. Davis, *Information System*, Palgrave Macmillan.

HUL 101 English In Practice

3 Credits (2-0-2)

Unit I

Functional Grammar:

Verbs / Tenses, Passive Voice, Indirect Speech, Practical session based on the topics.

Unit II

Functional Grammar:

Conditional Sentences, Questions / Questions Tags, Modal Verbs, Practical session based on the topics

Unit III

Functional Grammar:

The Infinitive and The ING form, Nouns and Articles, Determiners, Practical session based on the topics.

Unit IV

Functional Grammar:

Verbs with Prepositions and Adverbs, Relative Clauses, Linking Words

Unit V

Composition:

Dialogue Writing, Report, its importance and Report Writing

Unit VI

Composition:

Applications, Letter and Précis Writing, Technical Proposal Writings

Text-Books:

1. Wren & Martin, *High School English Grammar & Composition* – S. Chand & Co. Delhi.
2. Raman Meenakshi& Sharma Sangeeta, *Technical Communication-Principles & Practice* –
3. O.U.P. New Delhi. 2007.
4. MitraBarum K., *Effective Technical Communication* – O.U.P. New Delhi. 2006.
5. Better Your English- A Workbook for 1st year Students- Macmillan India, New Delhi.

Reference Books:

1. Horn A.S., *Guide to Patterns & Usage in English* – O.U.P. New Delhi.

CSL-279 Database Management System

5 Credits (3-1-2)

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.

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.

BCA							
THIRD SEMESTER							
S.No.	Subject	Code	Category	L	T	P	Credits
1	Internet of Things	CSL-319	DC	3	1	0	4
2	Operating Systems	CSL-272	DC	3	1	0	4
3	Introduction to Software Engineering	CSL 436	DC	3	1	0	4
4	Web Technology -1	CSL-277	DC	3	1	2	5
5	Object Orient Programming using C++	CSL-274	DC	3	1	4	6
6	Statistics for BCA	MAL-225	BM	3	1	0	4
7	Minor Project	CSD-282	DC	0	0	4	2

CSL 319Internets of Things

4 credits (3-1-0)

Unit -1

IoT& Web Technology : The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, Characteristics of IoT, IoT Applications and challaneges, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT, Four Pillars of IoT,Related Standardization, Recommendations on Research Topics.

Unit –II

IoT Architecture -State of the Art : Introduction, State of the art, Architecture Reference Model- Introduction, Reference Model and architecture, IoT reference Model, IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.

M2M to IoT – A Basic Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies.

M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.

Unit –III

IoTProtocols : Protocol Standardization for IoT , M2M and WSN Protocols, RFID Protocols & NFC protocols, Issues with IoT Standardization ,Unified Data Standards ,Protocols – IEEE 802.15.4, Zigbee, IPv6 technologies for the IoT, IPv6 over low-power WPAN (6LoWPAN)

IOT Analytics : Role of Analytics in IOT, Data visualization Techniques, Capabilities of available OSs in terms of processing, memory, networking support, scheduling etc., Comparison and case study of various IoT OS

Unit -IV

IoT Applications for Value Creations : Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT For Oil and Gas Industry, Opinions on IoT Application and Value for Industry, Home Automation, Cities, Environment, Energy, Logistics, Agriculture, Industry, Health & Lifestyle.

Unit – V

Internet of Things Privacy, Security and Governance :

Introduction, Overview of Governance, Internet of things Challenges: Vulnerabilities of IoT, Security, Privacy & Trust for IoT, Security requirements, Threat analysis, Use cases and misuse cases, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security, Cloud for IoT - Amazon Web Services for IoT.

Text Book :

1. Vijay Madisetti and ArshdeepBahga, “Internet of Things (A Hands-on-Approach)”, 1 st Edition, VPT, 2014
2. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1 st Edition, Apress Publications, 2013
3. ArshdeepBahga, Vijay Madisetti, “Internet of Things – A hands-on approach”, Universities Press, 2015

Reference Book :

1. CunoPfister, Getting Started with the Internet of Things, O‟Reilly Media, 2011, ISBN: 978-1-4493- 9357-1
2. Jean-Philippe Vasseur, Adam Dunkels, Interconnecting Smart Objects with IP: The Next Internet, Morgan Kuffmann
3. Cassimally, Hakim, “Designing the Internet of Things”, Wiley Publications, ISBN 10: 111843062X

CSL-272OPERATING 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:

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

CSL-436INTRODUCTION TO SOFTWARE ENGINEERING

4 credits (3-1-0)

Unit I

Introduction: Software Engineering approach, SDLC, Software Crisis, Software Process, Process models (Waterfall, Prototype, Iterative, Evolutionary and Spiral model)

Unit II

Software Requirement: Analysis and Specifications DFDs, Software Requirement Specifications, Steps for constructing good SRS.

Unit III

Software Design: Design Concepts & Principle, Cohesion & Coupling, Function Oriented Design, Object Oriented Design. Coding Structured programming, Programming style

Unit IV

Software Testing: Validation and Verification, Black Box testing approach, White Box testing approach, Levels of testing: Unit Testing, Integration Testing, Validation testing.

Unit V

Software Maintenance: Software Maintenance Process and its types, Introduction to Reverse Engineering, Software Reliability & Quality Assurance, Software Reliability issues, Software quality measurements.

Text Books:

1. Jalote P., *An Integrated approach to Software Engineering*, Narosa, 1991.

2. Mall Rajib, *Software Engineering*, Prentice Hall of India.

3. Pressman R.S., *Software Engineering – A Practitioner's Approach*, McGraw Hill Int.Ed., 1992.

Reference Books:

1. Sommerville Ian, *Software Engineering*, Pearson Education

2. Agrawal K.K. &Yogesh Singh, *Software Engineering*, New Age Publication

3. Waman S. Jawadekar,*Software Engineering-Principles and Practice,* McGraw Hill

CSL-274OBJECT ORIENT PROGRAMMING USING C++

6 credits (3-1-4)

Unit-1:

Introduction: Introducing Object-Oriented Approach, Relating to other paradigms (functional, data decomposition). Basic terms and ideas: Abstraction, Encapsulation, Inheritance, Polymorphism, Basic programming of C++.

Unit-2:

Classes and Objects: Encapsulation, abstract data types, Object & classes, attributes, methods, C++ class declaration, State identity and behavior of an object, Constructors and destructors, object types, Metaclass/abstract classes.

Friend: Friend Function, Friend Member Function and Friend Class.

Unit-3:

Inheritance: Access specifies, Types of inheritance, Ambiguity resolution in Multiple Inheritance, Constructor calling (Implicit and Explicit Constructor call) to base class, Containership and inheritance. Virtual Base Class,

Unit-4:

Polymorphism: Function Overloading, Operator overloading, operator overloading using friend. Virtual function & Pure Virtual function.

Unit-5:

File Handling:

Stream Classes Hierarchy, Opening and closing FILE, Read and write in file. File pointers and Manipulations. Error Handling in File Operation. Command line Argument

Text Books:

1. Lafore R., Object Oriented Programming using C++, Galgotia
2. Venugopal A.R. &Rajkumar, T. Ravishanker,Mastering C++, Tata McGraw Hill, 1997.

Reference Books:

1. Schildt Herbert, C++: The Complete Reference, Tata McGraw Hill, 1999.2
2. Balagurusamy E, "Object Oriented Programming with C++", TMH, 2001

MAL-225 STATISTICS FOR BCA

4 credits (3-1-0)

Unit 1:

Population, Sample And Data Condensation: Definition and scope of statistics, concept of population and sample with Illustration, Raw data, attributes and variables, classification, frequency distribution, Cumulative frequency distribution.

Unit 2:

Measures Of Central Tendency: Concept of central Tendency, requirements of a good measures of central tendency, Arithmetic mean, Median, Mode, Harmonic Mean, Geometric mean for grouped and ungrouped data.

Unit 3:

Measures Of Dispersion: Concept of dispersion, Absolute and relative measure of dispersion, range, variance, standard deviation , Coefficient of variation.

Unit 4:

Permutations And Combinations: Permutations of 'n' dissimilar objects taken 'r' at a time (with or without repetitions).

${}^{N}Pr = n! / (n-r) !$(without proof). Combinations of 'r' objects taken from 'n' objects.

${}^{n}Cr = n! / (r! (n-r) !)$ (Without proof).Simple examples, Applications.

Unit 5:

Sample Space, Events And Probability: Experiments and random experiments. Ideas of deterministic and non- deterministic experiments.Definition of- sample space, discrete sample space, events.Types of events, Union and intersections of two or more events, mutually exclusive events, Complementary event, Exhaustive event.Simple examples.

Classical definition of probability, Addition theorem of probability without proof (upto three events are expected), Definition of Conditional Probability Definition of independence of two events ,simple numerical problems.

Text Books:

1. S.C. Gupta - Fundamentals of Statistics – Sultan chand& sons, Delhi.
2. Goon, Gupta and Dasgupta – Fundamentals of Statistics - The world press private ltd., Kolkata.
3. Gupta S.P. – Statistical Methods, Pub – Sultan Chand and sons New Delhi

CSL-277 WEB TECHNOLOGY-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,

CSD-281Minor Project in Visual Basic

2 credits (0-0-4)

Students will develop a real time project by using Visual Basic as front end and Ms-Access or Oracle as back end.

They will submit the project in soft copy as well as in hard copy.

BCA							
FOURTH SEMESTER							
S.No.	**Subject**	**Code**	**Category**	**L**	**T**	**P**	**Credits**
1	Data Communication & Computer Networks	CSL 424	DC	3	1	0	4
2	Web Technology	CSL442	DC	3	1	4	6
3	Ethical Hacking	CSL444	DC	3	1	0	4
4	Operation Research	MAL280	BM	3	1	0	4
5	Programming in Java	CSL432	DC	3	1	4	6
6	Client Server Technology	CSL437	DC	3	1	0	4
7	Computer Organization And Architecture	CSL261	DC	3	1	0	4

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 444Ethical 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. RajatKhare, "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 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

MAL 280 Operation Research

4 Credits (3-1-0)

Unit-I

Inventory Models: Inventory models –various costs-deterministic inventory models, Single period inventory model with shortest cost, stochastic models, Application of inventory models, Economic lot sizes-price breaks.

Unit-II

Linear Programming Problems (LPP): Definition of LPP, Graphical Solutions of Linear Programming Problems, Simplex Method, and Artificial Variable Method, Two Phase Method, Charnes' Big-M Method, Duality, Dual Simplex Method.

Unit-III

Transportation Problems: Introduction to Transportation Model, Matrix Form of TP, Applications of TP Models, Basic Feasible Solution of a TP, Degeneracy in TP, Formation of Loops in TP, Solution Techniques of TP, Different Methods for Obtaining Initial Basic Feasible Solutions viz. Matrix Minima Method, Row Minima Method, Column Minima Methods, Vogel's Approximation Method, Techniques for Obtaining Optimal Basic Feasible Solution. Assignment Problems: Definition, Hungarian Method for AP.

Unit-IV

Replacement problems: Replacement problems-capital equipment-discounting costs-replacement in anticipation of failure- group replacement-stochastic nature underlying the failure phenomenon.

Unit-V (8 Hours)

Queuing Theory: Introduction to Queues, Basic Elements of Queuing Models, Queue Disciplines, Markovian Process, Erlang Distribution, Symbols and Notations, Distribution of Arrivals, Distribution of Service Times, Definition of Steady and Transient State.

Text Books:

1. S D Sharma,"Introduction to operation research", Kedarnath

2. Swarup K etal, "Operation Research", S. Chand

Reference Books:

1. Hadley, G.,"Linear Programming, and Massachusetts", Addison-Wesley

2. Taha, H.A, "Operations Research – An Introduction", Macmillian

3. Hiller, F.S., G.J. Lieberman, " Introduction to Operations Research", Holden-Day

CSL 432 Programming in Java

6 Credits (3-1-4)

Unit I

C++ Vs JAVA, JAVA and Internet and WWW, JAVA support systems, JAVA environment.JAVA program structure, Tokens, Statements, JAVA virtual machine, Constant & Variables, Data Types, Declaration of Variables, Scope of Variables, Symbolic Constants, Type Casting.

Operators: Arithmetic, Relational, Logical Assignments, Increment and Decrement, Conditional, Bitwise, Special, Expressions & its evaluation.

If statement, if…else… statement, Nesting of if…else… statements, else…if Ladder, Switch,? Operators, Loops – While, Do, For, Jumps in Loops, Labeled Loops.

Unit II

Defining a Class, Adding Variables and Methods, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods.

Inheritance: Extending a Class, Overriding Methods, Final Variables and Methods, Final Classes, Finalize Methods, Abstract methods and Classes, Visibility Control.

UnitIII

Arrays: One Dimensional & two Dimensional, strings, Vectors, wrapper Classes, Defining Interface Extending Interface, Implementing Interface, Accessing Interface Variable, System Packages, Using System Package, Adding a Class to a Package, Hiding Classes.

UnitIV

Creating Threads, Extending the Threads Class, Stopping and Blocking a Thread, Life Cycle of a Thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization, Implementing Thread

Unit V

Local and Remote Applets Vs Applications, Writing Applets, Applets Life Cycle, Creating an Executable Applet, Designing a Web Page, Applet Tag, Adding Applet to HTML File, Running the Applet, Passing Parameters to Applets, Aligning the Display, HTML Tags & Applets, Getting Input from the User.

Text books:

1. E. Balaguruswamy, "Programming In Java", 2nd Edition, TMH Publications ISBN 0-07- 463542

Reference books

1. Peter Norton, "Peter Norton Guide To Java Programming", Techmedia Publications

CSL- 437 Client Server

4 credits (3-1-0)

Unit - I

Client/Server Computing:

Introduction of Client/Server, Characteristics of the Client And theServer, Merits and Demerits of the Client Server, Types of Servers, ORB, Client ServerArchitectures, Stored Procedure, Remote Procedure Call (RPC).

Unit -II

The Client Side Services

Rrequest for services, RPC, windows services, fax, print services,

remote boot services, other remote services, Utility Services & Other Services, Dynamic DataExchange (DDE), Object Linking and Embedding (OLE).

The Server Side Services:

ServerFunctionality, Request Processing, Print Services, Database Services, Security Services, FileServices, Communication Services.

Unit - III

CORBA:

Object Management Group (OMG), Common Request Broker Architecture(CORBA), CORBA Object Services, CORBA Common Facilities, CORBA 3.0: NextGeneration, CORBA Style Interfaces, DCOM Objects, COM Servers.

Unit - IV

Client/Server Network:

Connectivity, Communication Interface Technology, InterposesCommunication, Wide Area Network Technologies, Network Topologies (Token Ring,Ethernet, FDDI, and CDDI), OSI Model, TCP/IP Architecture, TCP/IP Protocols.

Unit - V

Data Storage:

Magnetic Disk, Magnetic Tape, CD-ROM, WORM, Optical Disk, MirroredDisk, RAID, Network protection devices, Power Protection Devices, UPS, Surge protectors.

Client/Server System Development:

Training, Training advantages of GUI Application,System Administrator training, Database Administrator training, End-user training.The future of client server computing: Enabling Technologies, The transformational system.

Text Books :

1. Patrick Smith &SteaveGuengerich, "Client / Server Computing", PHI
2. Subhash Chandra Yadav,Sanjay Kumar Singh,"An Introduction to Client/Server Computing", New Age International Publishers

References:

1. Dawna Travis Dewire, "Client/Server Computing", TMH
2. P K Sinha, Computer Fundamentals, BPB
3. Godbole, 'Data communication and Networks', TMH

CSL261 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, BehroozParhami, Oxford University Press

MAL 280 Operation Research

4 Credits (3-1-0)

Unit-I

Linear Programming Model Formulation: Introduction, structure of linear programming model, Advantages of using linear programming ,limitations of linear programming,general mathematical model of linear programming problem, examples of LP model formulation and graphical method.

Unit-II

Linear Programming Problems (LPP): Simplex Method and Artificial Variable Method, Two Phase Method, Charnes' Big-M Method, Duality, Dual Simplex Method.

Unit-III

Transportation Problems: Introduction to Transportation Model, Matrix Form of TP, Applications of TP Models, Basic Feasible Solution of a TP, Degeneracy in TP, Formation of Loops in TP, Solution Techniques of TP, Different Methods for Obtaining Initial Basic Feasible Solutions viz. Matrix Minima Method, Row Minima Method, Column Minima Methods, Vogel's Approximation Method, Techniques for Obtaining Optimal Basic Feasible Solution. Assignment Problems: Definition, Hungarian Method for AP.

Unit-IV

Game Theory : Two-person Zero-sum Games, Pure Strategies(Minimax&Maximin principles): games with saddle point rules to Determine saddle point, Graphical method, Mixed strategies game without saddle point.

Unit-V

Queuing Theory: Introduction to Queues, Queue Disciplines, Symbols and Notations, Distribution of Arrivals, Distribution of Service Times, Definition of Steady and Transient State, Single server single channel Model (M/M/1)

Text Books:

1. S D Sharma,"Introduction to operation research", Kedarnath
2. Swarup K etal, "Operation Research", S. Chand

Reference Books:

1. Hadley, G.,"Linear Programming, and Massachusetts", Addison-Wesley
2. Taha, H.A, "Operations Research – An Introduction", Macmillian
3. Hiller, F.S., G.J. Lieberman, " Introduction to Operations Research", Holden-Day

BCA							
FIFTH SEMESTER							
S. No.	**Subject**	**Code**	**Category**	**L**	**T**	**P**	**Credits**
1	Software Quality & Management	CSL-449	DE	3	1	0	4
2	Cryptography & Network Security	CSL-759	DC	3	1	0	4
3	Enterprise Recourse Planning	CSL-545	DE	3	1	0	4
4	Cyber Law and Digital Forensic	CSL-549	DE	3	1	0	4
5	Computer Graphics & Multimedia	CSL-583	DC	3	1	4	6
6	Web Development using ASP.NET	CSL-544	DC	3	1	4	6
7	Industrial Training Report	CSD-549	DC	0	0	4	2

CSL-449 Software Quality Management

4 credits (4-0-0)

Unit-1:

Introduction: Software Quality, Role of testing, verification and validation, objectivesand issues of testing, Testing activities and levels, Sources of Information for Test CaseSelection, White-Box and Black-Box Testing , Test Planning and Design, Monitoring andMeasuring Test Execution, Test Tools and Automation, Test Team Organization andManagement .

Unit-2:

Unit Testing: Concept of Unit Testing , Static Unit Testing , Defect Prevention , DynamicUnit Testing , Mutation Testing , Debugging .Control Flow Testing: Outline of Control Flow Testing, Control Flow Graph, Paths in aControl Flow Graph, Path Selection Criteria, All-Path Coverage Criterion, StatementCoverage Criterion, Branch Coverage Criterion.

Unit-3:

Data Flow Testing: Overview of Data Flow Testing, Data Flow Graph, Data FlowTerms, Data Flow Testing Criteria, Comparison of Data Flow Test Selection Criteria,Feasible Paths and Test Selection Criteria.

Functional Testing: Equivalence Class Partitioning, Boundary Value Analysis, DecisionTables.

Unit-4:

System Integration Testing: Concept of Integration Testing, Different Types ofInterfaces and Interface Errors, System Integration Techniques, Software and HardwareIntegrationSystem Test Categories: Basic Tests, Functionality Tests, Robustness Tests,Interoperability Tests, Performance Tests, Stress Tests, Load and Stability Tests,Reliability Tests, Regression Tests, Documentation Tests.

Unit-5:

Software Quality: Five Views of Software Quality, McCall's Quality Factors andCriteria, Quality Factors Quality Criteria, Relationship between Quality Factors andCriteria, Quality Metrics, ISO 9126 Quality Characteristics, ISO 9000:2000 SoftwareQuality Standard ISO 9000:2000 Fundamentals, ISO 9001:2000 Requirements.

Text Books:

1. "Software Testing and Quality Assurance: Theory and Practice", SagarNaik, University of Waterloo, PiyuTripathy, Wiley , 2008
2. "Software Testing", Louise Tamres, Pearson Education Asia, 2002

Reference Books:

1. "Effective methods for Software Testing "William Perry, Wiley.
2. "Software Testing", SrinivasanDesikan and Gopalaswamy Ramesh – Pearson Education 2006.

CSL-759 Cryptography and Network Security

4 credits (4-0-0)

Unit-1:

Network Security: Attacks; Services & Mechanisms; Conventional Encryption: ClassicalEncryption Techniques, Model and Steganography.

Unit-2:

Encryption Schemes: DES: Standard, Strength; Block Cipher Design Principles; Block CipherModes of Operation: Triples DES; Placement & Encryption Function: Key Distribution, RandomNumber Generation, Placement of Encryption Function.

Unit-3:

Public-Key Cryptography: Principles; RSA Algorithm; Key Management; Fermat's &Euler'sTheorems; 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; AuthenticationHeader; 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, TheEvolution 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 ChangingERP Market. ERP- Functional Modules: Introduction, Functional Modules of ERP Software, Integrationof ERP, Supply chain and Customer Relationship Applications.

Unit-4:

ERP Implementation Basics, ERP Implementation Life Cycle, Role of SDLC/SSAD, Object OrientedArchitecture, Consultants, Vendors and Employees.

Unit-5:

ERP & E-Commerce, Future Directives- in ERP, ERP and Internet, Critical success and failurefactors, Integrating ERP into organizational culture.

Using ERP tool: either SAP or ORACLE format tocase 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-544 Web Development using ASP.NET

6 credits (4-0-4)

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.

Unit-II

C# Language: Data Types,Variables, Array and Strings, Object and Classes, Inheritance and Polymorphism, Operator Overloading, Interfaces. Boxing and Unboxing. C# Using Libraries: Namespace-System, Input Output, Multi-Threading

Unit-III

Delegates and Events Managing Console I/O Operations, Error Handling, Reflection, Windows Forms(IDE Environment), Concept of Versioning ,System.Collections;

Advanced Features Using C#: Windows Services, Web Services, Distributed Application in C#, Unsafe Mode, Graphical Device interface with C#.

Unit-IV

Introduction to ADO.NET : Benefits of ADO.NET | ADO.NET compared to classic ADO | DataSets | Managed Providers | Data Binding, DataSets and XML | Typed DataSets

Windows Forms and Controls in detail : The Windows Forms Model |Creating Windows Forms |Windows Forms Properties and Events |Windows Form Controls |Resizing | Menus | Dialogs | ToolTips

Unit-V

ASP .NET : Introduction to ASP.NET, Working with Controls, Using Rich Server Controls Accessing Data, Overview of ADO.NET | Connecting to Data | Executing Commands | Working with Data | Choosing an ADO.NET Provider | Configuration Overview | Using the Web Site Administration Tool | Programming Configuration Files | Encrypting Configuration Sections

Themes and Master Pages Creating a Consistent Web Site | ASP.NET 2.0 Themes | Master Pages Displaying Data with the GridView Control

ManagingState : 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 | Creating a DataListControl,Net Assemblies and Attribute: .Net Assemblies features and structure, private and share. Assemblies. Built-In attribute and custom attribute. Packing And Deployment of Application..

Text Books :

1. Addison Wesley –C# Developers Guide to ASP.Net
2. Wiley," Beginning Visual C# 2008",Wrox

Reference Books:

1. C#.Net Developers Guide- Greg Hack, Jason Werry, SaurabhNandu. (SyngRess)
2. Wrox Press Professional C# 3rd Edition – Simon Robinson, Jay Glynn

CSL-583Computer Graphics and Multimedia

4 credits (3-1-0)

Unit-1:

Graphics Primitives: Display Devices: Refresh Cathode Ray Tube, Raster Scan Display, Random scan Display, Plasma display, Liquid Crystal display, Aliasing and anti-aliasing in Raster technology.

Input Devices: Keyboard, Trackball, Joystick, Mouse, Light Pen, Tablet, and Digitizing Camera.

Input Techniques: Positioning techniques, Positioning Constraints, Scales & Guidelines, Rubber-Band techniques, Dragging, Dimensioning techniques and Graphical Potentiometers, Pointing and Selection: the use of selection points, defining a boundary rectangle, multiple selections, and Menu selection.

Unit-2:

Mathematics for Computer Graphics: Point representation, Vector representation, Matrices and operations related to matrices, Vector addition and vector multiplication, Scalar product of two vectors, Vector product of two vectors.

Line Drawing Algorithms: DDA algorithm for line, Bresenham's Line algorithm. Circle generating algorithms: DDA algorithm, Bresenham's algorithm, mid-point algorithm, polynomial algorithm, trigonometric algorithm, ellipse generating mid-point algorithm.

Segment & Display files: Segments, Functions for segmenting the display file, Posting and unposting a segment, segment naming schemes, Default error conditions, Appending to segments, Refresh concurrent with reconstruction, Free storage allocation, Display file Structure.

Graphics Operations: Clipping: Point Clipping, Line Clipping. Polygon Clipping.

Filling: Inside Tests, Flood fill algorithm, Boundary-Fill Algorithm and scan-line polygon fill algorithm.

Unit-3:

Conics, Curves and Surfaces: Quadric surfaces: Sphere, Ellipsoid, and Torus. Superquadrics: Superellipse, super ellipsoid. Spline & Bezier Representations: Interpolation and approximation splines curves, parametric continuity conditions, Geometric Continuity Conditions, Spline specifications. Bezier curves and surfaces.

Unit-4:

Transformation: 2D transformation, Basic Transformations, Composite transformations: Reflection, Shearing, And Transformation between coordinate systems.

3 D Graphics: 3 D Display Methods, 3 D modeling, 3 D transformations, Parallel projection, Perspective projection, Visible lines and surfaces identification, Hidden surface removal.

Unit-5:

Multimedia Terms, Hardware, Hardware peripherals, Basic tools in multimedia, Multimedia Building Blocks -Media Forms, elements, Sound, Image, Animation, Video, MPEG,JPEG,Graphic file formats, Multimedia Applications.

Animation: Introduction to Animation, Principles of Animation, Types of Animation, Types of Animation Systems: Scripting, Procedural, Representational, Stochastic, etc.

Animation Tools: Hardware –SGI, PC's, Amiga etc.

Software: Adobe Photoshop, Animation studio, Wave front etc.

Gif Animator: Microsoft GIF Animation, GIF Construction, GIFmation etc. **GKS:** GKS Standards, GKS Primitives – Polyline, Polymarker, and Fill area, Text, GKS Workstation and Metafiles.

Text Book:

1. Donald Hearn and M. Pauline Baker, "Computer Graphics", PHI
2. Computer Graphics Scheaum' series
3. Prabhat K Andleigh and KiranThakrar, "Multimedia Systems and Design", PHI, 2003
4. Mark J. Bunzel and Sandra K. Morris "Multimedia Application Development" Mcgraw-Hill Osborne Media; 2nd edition (September 1993)

Reference Books:

1. Rogers, "Procedural Elements of Computer Graphics", McGraw Hill
2. Bing J. Sheu and Mohammed Ismail "Multimedia Technology for Applications" Wiley-IEEE Press (June 22, 1998)

CSL-549 Cyber Law and Digital Forensic

4 credits (3-1-0)

Unit-I

Introduction to Cyber Security :

Overview of Cyber Security, Internet Governance – Challenges and Constraints, Cyber Threats:- Cyber Warfare-Cyber Crime-Cyber terrorism-Cyber Espionage, Need for a Comprehensive Cyber Security Policy, Need for a Nodal Authority, Need for an International convention on Cyberspace.

Unit II

Cyber Security Vulnerabilities and Cyber Security Safeguards : Cyber Security Vulnerabilities-Overview, vulnerabilities in software, System administration, Complex Network Architectures, Open Access to Organizational Data, Weak Authentication, Unprotected Broadband communications, Poor Cyber Security Awareness. Cyber Security Safeguards- Overview, Access control, Audit, Authentication, Biometrics, Cryptography, Deception, Denial of Service Filters, Ethical Hacking, Firewalls, Intrusion Detection Systems, Response, Scanning, Security policy, Threat Management.

Unit – III

Cyberspace and the Law : Introduction to cyber crime and cyber law, cyber space and information technology, Nature and scope of cyber crime, Jurisdiction of cyber crime, Important definitions under IT Act 2000, Cyber crime issues: unauthorized access, White collar crimes, viruses, malwares, worms, Trojans, logic bomb, Cyber stalking, voyeurism, obscenity in internet, Software piracy, Digital Signature, E Signature, Electronic Records, Electronic Evidence and Electronic Governance. Controller, Certifying Authority and Cyber Appellate Tribunal.(Rules announced under the Act).

Unit –IV

Fundamentals of Cyber Forensics : Cyber Forensic Basics- Introduction to Cyber Forensics, Introduction to Identity Theft & Identity Fraud. Types of CF techniques - Incident and incident response methodology - Forensic duplication and investigation. Preparation for IR: Creating response tool kit and IR team. - Forensics Technology and Systems - Understanding Computer Investigation – Data Acquisition.

Data Recovery Tools, Data Recovery Procedures and Ethics : Gathering Evidence- Precautions, Preserving and safely handling original media for its admissibility, Document a Chain of Custody and its importance, Complete time line analysis of computer files based on file creation, file modification and file access, Recover Internet Usage Data, Use computer forensics software tools .

Unit – V

Cyber Forensics Investigation : Introduction to Cyber Forensic Investigation, Investigation Tools, eDiscovery, Digital Evidence Collection, Evidence Preservation, E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Encryption and Decryption methods, Search and Seizure of Computers, Recovering deleted evidences, Password Cracking, Work on open Source, Commercial tools and Cyber range.

Text Books :

1. Craig, B. Cyber Law: The Law of the Internet and Information Technology. Pearson Education
2. Prosise, C. &Mandia, K. (2003). Incident response & computer forensics (2nd ed.). New York, NY: McGraw-Hill Companies.

Reference Books :

1. John R.Vacca, Computer Forensics||, Cengage Learning, 2005
2. MarjieT.Britz, Computer Forensics and Cyber Crime: An Introduction,3rd Edition, Prentice Hall,2013.
3. Gregory J. Touhill ,C. Joseph Touhill ,Cybersecurity for Beginners, Wiley-AIChE; 1 edition (July 8, 2014)

BCA							
SIXTH SEMESTER							
S.No.	**Subject**	**Code**	**Category**	**L**	**T**	**P**	**Credits**
1	Soft Computing	CSL606	DC	3	1	0	4
2	Data Warehouse And Data Mining	CSL608	DC	3	1	0	4
3	Digital Marketing	CSL614	DC	4	0	0	4
4	Advanced Java programming	CSL605	DC	3	1	4	6
5	Unix/Linux& Shell Programming	CSL620	DC	3	1	0	4
6	Hybrid Mobile Application (CSL615)	CSL615	DC	3	0	2	4
6	Major Project Work	CSD675	DC	0	0	8	4

CSL-606 Soft Computing ***4 Credits (3-1-0)***

Unit – I

Introduction to Intelligent systems and soft computing: Introduction, Intelligent systems, Knowledge-based systems, Knowledge representation and processing, soft computing.

Unit – II

Neural Networks:

Overview of biological Neuro-system, Mathematical Model of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcementLearning, Applications of Neural Networks.

Unit – III

Fuzzy Logic:

Crisp set and Fuzzy set, Basic concepts of fuzzy sets, membership functions. Basicoperations on fuzzy sets, Properties of fuzzy sets, Fuzzy relations.Propositional logic and Predicate logic, fuzzy If – Then rules, fuzzy mapping rules and fuzzyimplication functions, Applications of Fuzzy Logic.

Unit – IV

Genetic Algorithms:

Basic concepts of genetic algorithms, how are genetic algorithms differentfrom traditional algorithms, encoding, genetic modeling.

Unit – V

Hybrid Systems: Integration of neural networks, fuzzy logic and genetic algorithms.

Text Books:

1. Fakhreddine O. Karray, Clarence De Silva, “Soft Computing and Intelligent SystemsDesign: Theory, Tools and Applications”, Pearson Education, New Delhi.

2. Jyh-Shing Roger Jang, Chuen-Tsai Sun, EijiMizutani, “Neuro-Fuzzy and SoftComputing: A Computational Approach to Learning and Machine Intelligence”, 1996,PHI Learning Pvt. Ltd. New Delhi.

3. Anderson J.A. “An Introduction to Neural Networks”, PHI, 1999

Reference Books:

1. G. J. Klir& B. Yuan, “Fuzzy Sets & Fuzzy Logic”, PHI, 1995

2. Melanie Mitchell, “An Introduction to Genetic Algorithm”, PHI, 1998

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 setmining methods, From association mining to correlation analysis.Classification: Introduction, issues, classification by decision tree induction, rule basedclassification, 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 complexdata objects, mining spatial database, multimedia database, mining World Wide Web.

Applications and trends in data mining: Data mining applications, data mining system productsand 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
4. B. M. Shawkat Ali, Saleh A. Wasimi, “Data Mining Methods and Techniques”,

Cengage Learning, 2009

CSL-614 DIGITAL MARKETING **4 Credits (4-0-0)**

UNIT -1

Introduction to Digital Marketing-

Evolution of Digital Marketing from traditional to modern era, Role of Internet;Current trends, Info-graphics, implications for business & society; Emergence of digital marketing as a tool; Drivers of the new marketing environment; Digital marketing strategy; P.O.E.M. Framework, Digital landscape, Digital marketing plan, Digital marketing models.

UNIT- 2

Internet Marketing and Digital Marketing Mix –

Internet Marketing, opportunities and challenges; Digital marketing framework; Digital Marketing mix,Impact of digital channels on IMC;

Search Engine Advertising:

Pay for Search Advertisements, Ad Placement, Ad Ranks, Creating Ad Campaigns, Campaign Report Generation

Display marketing:

Types of Display Ads, Buying Models, Programmable Digital Marketing, Analytical Tools, YouTube marketing

UNIT-3

Social Media Marketing – Role of Influencer Marketing, Tools & Plan–

Introduction to social media platforms, penetration & characteristics; Building a successful social media marketing strategy

Facebook Marketing: Business through Facebook Marketing, Creating Advertising Campaigns, Adverts, Facebook Marketing Tools,

Linkedin Marketing: Introduction and Importance of Linkedin Marketing, Framing Linkedin Strategy, Lead Generation through Linkedin, Content Strategy, Analytics and Targeting

Twitter Marketing: Introduction to Twitter Marketing, how twitter Marketing is different than other forms of digital marketing, framing content strategy, Twitter Advertising Campaigns

Instagram and Snapchat: Digital Marketing Strategies through Instagram and Snapchat

Mobile Marketing: Mobile Advertising, Forms of Mobile Marketing, Features, Mobile Campaign Development, Mobile Advertising Analytics

UNIT-4

Introduction to social media metrics

Introduction to SEO, SEM, Web Analytics, Mobile Marketing, Trends in Digital Advertising–

Introduction and need for SEO, How to use internet & search engines; search engine and its working pattern, On-page and off-page optimization, SEO Tactics

Introduction to SEM

Web Analytics:

Google Analytics & Google AdWords; data collection for web analytics, multichannel attribution, Universal analytics, Tracking code

UNIT-5

Trends in digital advertising Application:

A group of two students (Maximum) has to work on creating an advertising campaign through any form of digital marketing viz: Mobile Marketing, Twitter Marketing, Facebook Marketing, LinkedIn Marketing, Instagram or Snap chat Marketing, work on creating the campaign, running the campaign, presenting the results of the campaign in terms of Lead Generation and / or sales and / or web analytics.

Text Book:

1. SeemaGupta ,Digital Marketing Mc-Graw Hill 1st Edition – 2017
2. Ian Dodson,The Art of Digital Wiley Latest Marketing Edition

ReferenceBook :

1. Dr.RagavendraK.andShruthi P. Digital Marketing, Himalaya Publishing House Pvt. Ltd.
2.Prof. Nitin C. Kamat, Mr.ChinmayNitinKamat, Digital Social Media Marketing, Himalaya Publishing House Pvt. Ltd.

CSL-605Advanced Java programming *6 credits (3-1-4)*

Unit-1:

Java Database Connectivity: JDBC Product, Types of Drivers, Two-Tier Client/Server Model,Three-Tier Client/Sever Model, Basic Steps of JDBC, Creating and Executing SQL Statement, The Result Set Object, Working with Database MetaData, Interface

Unit-2:

Servlets:

Servlet Interaction & Advanced Servlets, Life cycle of Servlet, Java Servlet Development Kit, Javax.servlet package, Reading Servlet Parameters, Reading Initialization Parameters, The javax.servlet.http PackageHandling HTTP

Unit-3:

JavaServer Pages:

JSP Technologies, Understanding the Client-Server Model, Understanding Web server softwareConfiguring the JSP Server, Handling JSP Errors, JSP Translation Time Errors, JSP Request Time Errors, Creating a JSP Error Page

Unit-4:

RMI: RMI Architecture, Designing RMI application, Executing RMI application

EJB: Types of EnterpriseJava beans, Session Bean & Entity Bean, Features of Session Bean, Life-cycle of StatefulSeession Bean, Features of Entity Bean, Life-cycle of Entity Bean, Container-managed Transactions &Bean-managed Transactions, Implementing a container-manged Entity Bean

Unit-5:

XML: What is XML?,XML Syntax Rules

Struts

Introduction to the Apache Struts, MVC Architecture, Struts Architecture, How Struts Works?, Introduction to the Struts Controller, Introduction to the Struts Action Class, Using Struts ActionFrom Class, Using Struts HTML Tags, Introduction to Struts Validator Framework, Client Side Address Validation in Struts, Custom Validators Example, Developing Application with Struts Tiles

Text Books-

1. Black Book of Java
2. Complete Reference Java

CSL-620 Unix/Linux & Shell Programming *4 Credits (3-1-0)*

Unit – I

Overview of Linux:

Introduction to operating system, features and roles, Open Sourceadvantages, Introducing Linux as operating system, Exploring Linux distributions, Architectureof Linux, types of shell, File System, File management- types of files, absolute and relativepaths, 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 FilePermissions, Locating files, Common filter commands, Using MAIL, Host Information,Daemons and Clocks, Printing and Networking Commands, Process Management- componentsof 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 Metacharacters, Positional Parameters and Special Parameters.

Unit - III

Linux Editor:

Introducing vim: A Modal Editor, modes of vim, status line commands, Opening & modifyinga file, Saving a file and exiting vim, Search and Replace, undoing changes, yanking, Accessingmultiple files, Window Commands, Interacting with system, Macros, vim configuration. Exbasics, 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 LineArguments, 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 accountmanagement, monitoring system performance, configuring hardware, Managing File Systems,using su, sudo, sticky bits, using configuration and log files, maintaining effective data backupstrategy, managing run levels, using graphical administration tools, managing security – usingpassword 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

CSL615 - Hybrid Mobile Application CreditL:3 T:0 P:2 : 4

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