

M.Sc. (IT)							
FIRST SEMESTER							
S.No.	Subject	Code	Category	L	T	P	Credits
1	Programming in C	CSL 120	DC	3	1	0	4
2	Operating Systems	CSL 373	DC	3	1	0	4
3	Statistics	MAL-226	DC	3	1	0	4
4	Web Technology-I	CSL277	DC	3	1	4	6
5	Software Engineering	CSL-740	DC	3	1	0	4
6	Fundamentals Of Computers & IT	CSL 107	DC	3	1	0	4
7	C Language LAB	CSP 105	DC	0	0	4	2

### CSL 120 PROGRAMMING IN C

6 credits (3-1-0)

#### 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”, 4<sup>th</sup> Edition. BPB Publications.
2. Gottfried, Byron S: “Programming with C”, 1996. Tata McGraw-Hill.

**Reference Books:**

1. Balagurusamy, E: “Programming in ANSI C” 2<sup>nd</sup> Edition. Tata McGraw-Hill.
2. Deitel, H M and Deitel P J: “C How to Program”, 2nd Edition. Prentice-Hall.

**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<sup>2</sup>PROM, 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” 4<sup>th</sup> Edition, 2000. TMH.
2. Malvino, Paul Albert and Leach, Donald P: “Digital Computer Fundamentals” 3<sup>rd</sup> Edition, 1995. TMH.
3. Bartee, Thomas C: “Digital Computer Fundamentals” 6<sup>th</sup> Edition, 1995. TMH.

**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

**MAL-226 STATISTICS**

*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 ).

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

${}^n C_r = n! / (r! (n-r) !)$  (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 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,

M.Sc. (IT)							
SECOND SEMESTER							
S.No.	Subject	Code	Category	L	T	P	Credits
1	Data Structures	CSL 611	DC	3	1	0	4
2	Database Management System	CSL 305	DC	3	1	2	5
3	Computer Organization and Architecture	CSL 761	DC	3	1	0	4
4	Operations Research	MAL 280	DC	3	1	0	4
5	Web Technology	CSL 442	DC	3	1	4	6
6	Data Structures Lab	CSP 320	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.

#### 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-305 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*, Addison Wiley.

#### **Reference Books:**

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

### **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, Bartee C. 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 Parthasarthy, Thomson
3. Computer Organisation by Hamacher C, Zaky S. McGraw Hill
4. Computer Architecture, Behrooz Parhami, 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 et al, "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 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 MySQLi, 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(), Handling 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. Gundavarma Shishir, *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



M.Sc. (IT)							
THIRD SEMESTER							
S.No.	Subject	Code	Category	L	T	P	Credits
1	Enterprise Resource Planning	CSL-545	DE	3	1	0	4
2	E-Commerce	CSL-770	DC	3	1	0	4
3	Advanced Database management	CSL-753	DC	3	1	2	5
4	Internet and Java Programming	CSL 712	DC	3	1	0	4
5	Cloud Computing	CSL-771	DE	4	0	0	4
6	Java Programming Lab	CSP 782	DC	0	0	4	2
7	Seminar - Research Paper	CSD-740	DC	0	1	2	2

**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-753 Advance Database Management System**

*4 credits (3-0-2)*

/

**Unit 1 : Overview**

Intro to DBMS, Features, Database Models, Concept and Architecture, Database and Database Users , Database Setup and Configuration , Data Modelling Keys, Integrity Constraints, SQL, SQL(DML, DDL & DCL Commands)

**Unit 2: Transaction Processing**

Definition of Transaction and ACID properties. Transaction Processing - Transaction-processing monitors, transactional workflows, main-memory databases, real-time transaction systems, long-duration transactions, transaction management in multi-databases. Concurrency Control Locks, Optimistic Concurrency Control (Backward and Forward validations), Timestamping Concurrency Control

**Unit 3:**

Designing and Creating Views , 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, Dynamic SQL, and ODBC Standard.

**Unit 4: Parallel and Distributed databases**

Architecture for Parallel databases – Parallelizing Individual operations – Parallel query Evaluation Introduction to DDBMS , Architecture of DDBs , Storing data in DDBs , Distributed catalog management , Distributed query processing , Distributed concurrency control and recovery , Transaction Processing. spatial, temporal and constraint database management systems, New database applications and architectures: e.g. Data Warehousing; Multimedia; Mobility; Multidatabases; NoSQL, Native XML databases (NXD), Internet

**Unit 5 : Object Databases Systems and Database Security**

Introduction – User-defined ADTs – Structured types – Object, object identity and references – Inheritance – Database design for ORDBMS – New Challenges in implementing ORDBMS Storage & access methods Query processing & Optimization, Comparison between OODBMS and ORDBMS , Security considerations  
Security and integrity threats, Defence mechanisms, Statistical database auditing & control. Security issue based on granting/revoking of privileges, Introduction to statistical database security. PL/SQL Security – Locks – Implicit locking, types and levels of locks, explicit locking

**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.

**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-771 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*, CRC 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'Reilly'

M.Sc. (IT)							
FOURTH SEMESTER							
S.No.	Subject	Code	Category	L	T	P	Credits
1	<b>Programming with Python</b>	<b>CSL 713</b>	<b>DE</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
2	<b>Data Communication &amp; Computer</b>	<b>CSL 424</b>	<b>DC</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
3	<b>AI &amp; Expert Systems</b>	<b>CSL 671</b>	<b>DC</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
4	<b>Analysis and Design of Algorithm</b>	<b>CSL-621</b>	<b>DC</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
5	<b>Data Ware House and Data Mining</b>	<b>CSL-608</b>	<b>DE</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
6	<b>Python Programming Lab</b>	<b>CSP 783</b>	<b>DC</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>
7	<b>Major project</b>	<b>CSD 855</b>	<b>DC</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>

### **CSL 713 Programming with Python** **4 Credits (3-1-0)**

#### **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,

### **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.

**Suggested reading:****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 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; Skolemisation; 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 World; 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 – 889 Analysis and Design of Algorithms**  
**4 Credits (3-1-0)****Unit 1:****Introduction:**

The role of Algorithms in Computing, Analyzing algorithms, Designing algorithms, Asymptotic notations Introduction to arrays, linked lists, stacks, queues, priority queue, heap, binary tree and search trees

**Unit II**

Divide and Conquer Technique:

The substitution method for solving recurrences, The recursion tree method for solving recurrences, The master method for solving recurrences

**Sorting**

Insertion, Merge, quick, radix

Heapsort:

Heaps, Maintaining the heap property, Building a heap, The heapsort algorithm, Priority queues

**Unit III**

**Red-Black Trees:**

Properties of red – black trees, Rotations, Insertion, Deletion

Dynamic Programming:

Matrix-chain multiplication, Longest common subsequences

**Unit IV**

**Greedy Technique:**

An activity selection problem, Elements of greedy strategy, Huffman codes

Single –Source Shortest Paths:

The Bellman-Ford algorithm, Single-source shortest paths in directed acyclic graphs, Dijkstra's algorithm

**Unit V**

**String Matching:**

The naïve string matching algorithm, The Rabin Karp algorithm

**NP-Completeness and the P & NP Classes:**

Introduction, Polynomial Time & Verification, NP-Completeness and Reducibility, The Traveling Salesman Problem

**Text Books :**

1. *Computer Algorithms* by Horowitz, Sahni and Rajasekaran, Computer Science Press (1997) ISBN 0-7167-8315-0 (-8316-9)

**Reference Books :**

1. *Algorithm Design*, Jon Kleinberg and Eva Tardos, Addison Wesley, ISBN 0-321-29535-8.

**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 discretization 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
4. B. M. Shawkat Ali, Saleh A. Wasimi, “Data Mining Methods and Techniques”, Cengage Learning, 2009