School of Engineering and Technology

Programme Structure & Syllabus

Master of Computer Application (MCA)

2022-23

K.K. University

Bihar Sharif, Nalanda – 803115

FIRST SEMESTER

S.NO	CODE	COURSE TITLE	CREDIT	L	T	P	Hours per	Internal	External
1	MCAT101	Object Oriented Programming	4	3	2	--	4	30	70
2	MCAT102	Discrete Mathematics	4	4	--	--	4	30	70
3	MCAT103	Problem Solving and Programming	3	3	--	--	3	30	70
4	MCAT104	Statistical Techniques	2	2	--	--	2	30	70
5	MCAT105	Database Management System	4	4	--	--	4	30	70
6	MCAT106	Soft Skills	2	2	--	--	2	30	70
7	MCAL101	Object Oriented Programming Lab	1	--	--	1	2	30	70
8	MCAL103	C Programming Lab	1	--	--	1	2	30	70
9	MCAL105	Database Management System Lab	1	--	--	1	2	30	70
10	MCAL106	Soft Skills Lab	1	--	--	1	2	30	70
		TOTAL	23	18	2	4	27	300	700

SECOND SEMESTER

S.NO	CODE	COURSE TITLE	CREDIT	L	T	P	Hours per	Internal	External
1	MCAT201	Core Java	4	3	2	--	4	30	70
2	MCAT202	Data Structure and Algorithm	4	3	1	0	4	30	70
3	MCAT203	Computer Networks	3	3	0	0	3	30	70
4	MCAT204	Dot Net Technology	3	3	0	0	3	30	70
5	MCAT205	Operating System	3	3	1	0	3	30	70
6	MCAT206	Accounting & Financial	2	2	0	0	2	30	70
7	MCAL201	Core Java Lab	1	0	0	1	2	30	70
8	MCAL202	Data Structures and Algorithm Lab	1	0	0	1	2	30	70
9	MCAL203	Computer Networks Lab	1	0	0	1	2	30	70
10	MCAL204	Dot Net Lab	1	0	0	1	2	30	70
		TOTAL	23	17	4	4	27	300	700

THIRD SEMESTER

S.NO	CODE	COURSE TITLE	CREDIT	L	T	P	Hours per week	Internal	External
1	MCAT301	Design and Analysis of Algorithms	3	3	1	0	3	30	70
2	MCAT302	Software Engineering	3	3	0	0	3	30	70
3	MCAT303	Advance Java	3	3	2	0	3	30	70
4	MCAT304	Data Mining	3	3	0	0	3	30	70
5	MCAT305	Python Programming	3	3	0	0	3	30	70
6		**Elective I**	4	4	0	0	4	30	70
7	MCAL301	Design and Analysis of Algorithms	1	0	0	4	4	30	70
8	MCAL303	Advance Java Lab	1	0	0	4	4	30	70
9	MCAL305	Python Programming Lab	1	0	0	4	4	30	70
		TOTAL	22	19	3	12	31	270	630

Elective I

MCAT306 : **Artificial Intelligence**

MCAT307: Parallel Computing

MCAT308: CYBER Security MCAT309:

Cloud Computing

FOURTH SEMESTER

S.NO	CODE	COURSE TITLE	CREDIT	L	T	P	Hours per week	Internal	External
1	MCAL401	Dissertation (Major Project)	20	0	0	4	20	100	400
2	MCAL402	Seminar	4	0	2	0	4	30	70
		TOTAL	24	0	2	4	24	130	470

SEMESTER-I

Object Oriented Programming

MCAT101   **L-T-P(3-2-1)**   **Credit-4**

UNIT I
Introduction to OOPs: What Is Object-Oriented Programming? , Encapsulation, Polymorphism, Inheritance.

C++ Overview: The Origins of C++,The General Form of a C++ Program, different data types, operators, expressions, arrays and strings, reference variables. Function Components, argument passing, inline functions, function overloading, function templates.

UNIT II
Classes & Objects: Introduction, Class Specification, Class Objects, access members, defining member functions, data hiding, constructors, destructors, parameterized constructors, static data members, static member functions, scope resolution operator, Passing Objects to Functions, Returning Objects, Object Assignment.

Pointers and dynamic memory allocation: Pointers, Pointer as function arguments, Dynamic Allocation Operators new and delete, Initializing Allocated Memory, Allocating Arrays, Allocating Objects

UNIT III
Operator overloading: Operator overloading as member functions and using friend functions. Overloading of binary operators like +, -, *.Creating Prefix and Postfix forms of ++, -- Operators, Operator Overloading Restrictions, Operator Overloading Using a Friend Function to Overload ++ or – –, Overloading ( ).

Inheritance: Base Class, Inheritance & protected members, protected base class inheritance, inheriting multiple base classes, Constructors, Destructors & Inheritance. Passing parameters to base Class Constructors, Granting access, Virtual base classes.

UNIT IV
Virtual Functions and Runtime Polymorphism: Virtual function -Calling a Virtual function through a base class reference, Virtual attribute is inherited, Virtual functions are hierarchical, pure virtual functions, abstract classes, using Virtual functions, Early & late binding.

Standard C++ I/O Classes: Old vs. Modern C++ I/O, C++ Streams, The C++ Stream Classes, C++'s Predefined Streams, Formatted I/O, Formatting Using the ios Members, Setting the Format Flags, Clearing Format Flags, Overloading << and >>, manipulators

UNIT V
Exception Handling: Exception Handling, Fundamentals, Catching Class Types, Using Multiple catch Statements, Handling Derived-Class Exceptions, Exception Handling Options, Catching All Exceptions, Restricting Exceptions, Rethrowing an Exception, Understanding terminate( ) and

unexpected( ), uncaught_exception( ) Function, The exception and bad_exception Classes, Applying Exception Handling.

STL: Class template, An overview of STL, containers, vectors

COURSE OUTCOMES
1. Gain the basic knowledge on Object Oriented concepts.
2. Ability to develop applications using Object Oriented Programming Concepts.
3. Ability to implement features of object oriented programming to solve real world problems.

TEXT BOOKS:
1. Ira Pohl, "Object-Oriented Programming Using C++", Pearson Education Asia, 2003.

2. Object-Oriented Programming with C++ by E Balagurusamy

REFERENCE BOOKS:
1. Herbert Schildt, "Complete Reference", Fourth edition, TMH, 2002
2. Bjarne Stroustrup, "The C++ Programming Language", Pearson Education, 2004.
3. Stanley B. Lippman and Josee Lajoie , "C++ Primer", Pearson Education, 2003.
4. K.R.Venugopal, Rajkumar Buyya, T.Ravishankar, "Mastering C++", TMH, 2003

Discrete Mathematics

MCAT102   **L-T-P(4-0-0)**   **Credit-4**

UNIT I

Sets: Definition and types, Set operations, Partition of set, Cardinality (Inclusion- Exclusion & Addition Principles), Recursive definition of set. Functions: Concept, Some Special Functions (Polynomial, Exponential & Logarithmic, Absolute Value, Floor & Ceiling, Mod & Div Functions), Properties of Functions, Cardinality of Infinite Set, Countable & Uncountable Sets, the Pigeonhole & Generalized Pigeonhole Principles, Composition of Functions.

UNIT II

Relations: Boolean Matrices, Binary Relation, Adjacency Matrix of Relation, Properties of Relations, Operations on Relations, The Connectivity Relations, Transitive Closure-Warshall's Algorithm, Equivalence relations- Congruence Relations, Equivalence Class, Number of Partitions of a Finite Set, Partial & Total Orderings.

UNIT III

Proof Methods: Vacuous, Trivial, Direct, Indirect by Contrapositive and Contradiction, Constructive & Non-constructive proof, Counter example. The Division Algorithm,Divisibility Properties (Prime Numbers & Composite Numbers), Principle of Mathematical Induction, the Second Principle of Mathematical Induction, Fundamental Theorem of Arithmetic. Algorithm Correctness: Partial Correctness, Loop Invariant. Testing the partial Correctness of linear & binary search, bubble & selection sorting.

UNIT IV

Graph Theory: Graphs – Directed, Undirected, Simple,. Adjacency & Incidence, Degree of Vertex, Sub graph, Complete graph, Cycle & Wheel Graph, Bipartite & Complete Bipartite Graph, Weighed Graph, Union of Simple Graphs. Complete Graphs. Isomorphic Graphs, Path, Cycles & Circuits Euclerian & Hamiltonian Graphs. Planar Graph: Kuratowski's Two Graphs, Euler's Formula, Kuratowski's Theorem. Trees: Spanning trees- Kruskal's Algo, Finding Spanning Tree using Depth First Search, Breadth First Search, Complexity of Graph, Minimal Spanning Tree.

UNIT V

Language of Logic: Proposition, Compound Proposition, Conjunction, Disjunction, Implication, Converse, Inverse & Contrpositive, Biconditional Statements, tautology, Contradiction & Contingency, Logical Equivalences, Quantifiers, Arguments.

References:

1. Discrete Mathematics with Applications, Koshy, ELSEVIER

2. Discrete Mathematical Structures By Lipschutz & Lipson, TMH
3. Discrete Mathematical Structures, Kolman et.al, Pearson

Problem Solving and Programming in C

MCAT103   **L-T-P(3-0-1)**   **Credit-3**

UNIT I

Problem Solving: Problem Identification, Analysis, Flowcharts, Decision tables, Pseudo codes and algorithms, Program coding, Program Testing and execution; Types of programming languages, Translators, Interpreters, Compilers, Assemblers and their comparison.

Fundamentals of C language: History of C Language, Structure of a C program, Variables, Constants, Keywords, Data types, Operators, Expressions and their evaluation using rules of hierarchy, typecasting, Input/output statements, Assignment statements, Control statements: if- else, switch, while, do-while, for, nested loops, break, continue, go to statements.

UNIT II

Functions: Declaration, Definition, function prototype, passing arguments: call by value, callby reference, Recursion and stack, Use of library functions, adding functions to the library, Functions with variable arguments; Storage classes: automatic, external and static variables.

Arrays: Defining and processing arrays, Passing array to a function, Using multi-dimensional arrays, Solving matrices problems using arrays;

UNIT III

Strings and Pointers: String: declaration, Operations on strings, Two-dimensional array of characters; Pointer: declaration, Operations on pointers, Passing pointers to functions, , Arraysof pointers, Array of pointers to strings.

Structure and Union: Structures: Defining and processing, Passing structure to a function, Arrays of structures, Pointers and structures, Uses of structures; Unions: Defining and processing, Pointers and union, Union of structures, Uses of union.

UNIT IV

Files Handling: Concept of files, file opening modes, opening and closing of a file, reading from a file, writing onto a file, Error handling during I/O operations, Record I/O in Files.

Miscellaneous: Command line arguments, Enumerated data types, Renaming data types with typedef, Pre-processor directives, Using GCC for programming in C under Linux.

Suggested Readings:

1. Kanetkar, Yashavant, 2016, Let Us C, BPB Publications.
2. Cooper, Mullish, 1987: The Spirit of C, An Introduction to Modern Programming, Jaico Publ. House, New Delhi.
3. Kenneth, A.: C Problem Solving and Programming, Prentice Hall International.
4. Kerninghan, B.W. &Ritchie, D.M.: The C Programming Language, Prentice Hall of International.

5. Gottfried, B.: Theory and Problems of Programming in C, Schaum Series.

6. Jones, A. /KenithHarvow: C Programming with Problem Solving, Wiley India Pvt. Ltd.

7. Gookin, Dan: C Programming, Wiley India Pvt. Ltd

Statistical Techniques

MCAT104   **L-T-P(2-0-0)**   **Credit-2**

UNIT I
Probability and probability distribution

Various definition of probability, additive and multiplicative theorem, independent event, probability distribution, mathematical expectations, additive and multiplicative theorem of expectation, Binomial, Poisson and normal distribution, Fitting of Binomial distribution.

UNIT II
Descriptive Statistics

Measure of central tendencies, Dispersion , Measure of Dispersion, product of moments, correlation coefficients, Rank correlation, Linear Regression, Properties of regression coefficient, Multiple linear regression.

UNIT III
Numerical Methods

Transcendental and polynomial equations: Iterative methods, Regula- Falsi method, -Raphsonmethod. Roots of polynomial: Giraffes and Bairstow methods . Solution of system of algebraic linear equations: Gauss elimination, Gauss Jordan , Data fitting, Method of least square.

UNIT IV
Test of significance

Null and alternative hypothesis, One tail and two tail tests, Two types of errors, Large sampletests, Small sample tests, Test of single mean, Test of equality of two means, Paired test, test of goodness of fit, test of independence of attributes, Test of variance.

UNIT V
Sampling techniques and analysis of variance

Sampling and complete enumeration, Simple random Sampling, Stratified random Sampling,Proportional and Optimum allocations.
ANOVA: One way and two way classifications.

TEXT AND REFERENCE BOOKS:
- 1 G. W. Snedcor and W.G. Cochrass: " Statistical Methods", 6 Edn East West press.
- 2 S. C. Gupta: " Introduction to Mathematical Statistics", 1973, Sultan Chand.
- 3 S. C. Chapra and R. P. Canales: " Numerical Methods for Engineers", 2002 TMH.

Database Management System

MCAT105   **L-T-P(4-0-1)**   **Credit-4**

UNIT – I

Introduction; An example; Characteristics of Database approach; Actors on the screen; Advantages of using DBMS approach; A brief history of database applications; Data models, schemas and instances; Three-schema architecture and data independence; Database languages and interfaces; The database system environment; Centralized and client-server architectures; Classification of Database Management systems, ACID Properties.

UNIT – II

Data Models- Introduction , Data Association-(Entities, Attributes And Associations, Relationship Among Entities, Representation Of Association And Relationship), Data Model Classification-(Approaches To The Relational Model, Hierarchical Model & Network Model With an Examples), Entity – Relationship Model, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and Structural Constraints; Weak Entity Types; Refining the ER Design; ER Diagrams, Naming Conventions and Design Issues;

UNIT-III

Relational Model Concepts; Relational Model Constraints and Relational Database Schemas; Keys in DBMS Update Operations, Transactions and dealing with constraint violations; Unary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations : JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra; Relational Database Design Using ER- to-Relational Mapping.

UNIT - IV

Normalization, First –Second- Third Normal Forms, Relational With More Than One Candidates Key ,Good And Bad Decomposition, Multivalued Dependency,Fourth Normal Form, Fifth Normal Form. Network Data Model, Hierarchical Data Model:The Tree Concept, Data Manipulation.

UNIT – V

The ACID Properties; Transactions and Schedules; Concurrency Control: Problem Of Concurrent Access, Resource Looking, Deadlock, Database Recovery: Restore, Backward & Forward Recovery, Introduction to crash recovery.

Soft Skills

MCAT106   **L-T-P(2-0-1)**   **Credit-2**

Course Objectives and Outcomes

The objective of this course to help the students to develop as team member, leader and all round professional in the long run. This course would focus on over all personality development of the student and to improve his technical writing and documentation.

Having successfully completed this course, the student will be able to:

- ➢ Communicate, interact and present his ideas to the other professionals.
- ➢ Understand and aware of importance, role and contents of soft skills throughinstructions, knowledge acquisition, demonstration and practice.

Have right attitudinal and behavioral aspects, and build the same through
- ➢ Activities.
- ➢ Possess right professional and social ethical values.

UNIT I: Self Awareness and self-Development 2L

Self-Assessment, Self-Awareness, Perceptions and Attitudes, Positive Attitude, Values and Belief Systems, Self-Esteem, Self-appraisal, Personal Goal setting, Career Planning, Personal success factors, Handling failure, Emotional Intelligence, Lateral thinking, Depression and Habit, relating SWOT analysis & goal setting, prioritization.

UNIT II: Communication Skill 2L

Importance of communication, Aspects of communication, communication through words, communication through body language, communication through technology, Oral communication, Listening Skills, Group Discussion and Interview Skills, Presentation skills: preparing the presentation, performing the presentation,
Written communication: Reading comprehension, précis writing, Business and technical reports, Styles, Business correspondence, Memorandum writing, Notice, Agenda and Minutes, Research papers and articles, Advertising and job Description, Mechanics of Manuscript preparation.

UNIT III: Interpersonal relationship 3L

Team work, Team effectiveness, Group discussion, Decision making - Team Communication. Team, Conflict Resolution, Team Goal Setting, Team Motivation Understanding Team Development, Team Problem Solving, Building the team dynamics, Multicultural Diversity and Socializing

UNIT IV: Leadership Skills 2L

Leaders: their skills, roles, and responsibilities. Vision, Empowering and delegation, motivating others, organizational skills, team building, Organizing and conducting meetings, decision making, giving support, Vision, Mission, Coaching, Mentoring and counseling, Appraisals and feedback, conflict, Power and Politics, Public Speaking.

UNIT V: Other Skills 2L

Managing Time, Managing Stress, Meditation. Improving personal memory, Study skills that include Rapid Reading, Notes Taking, Self-learning, Complex problem solving and creativity, listening skills and speaking skills, Corporate and Business Etiquettes.

UNIT VI: Ethics in Engineering Practice and Research 3L

Introduction to ethical reasoning and engineer ethics, Right and responsibilities regarding Intellectual property, workplace rights and responsibilities, Central Professional Responsibilities of Engineers, Responsibility for environment.

Practical's to be done:-

Term Work/Assignments SWOT Analysis
Personal & Career Goal setting – Short term & Long term Presentation Skill Dining
Etiquettes Letter/Application/Notice/Agenda/Minutes writing Report writing
Listening skills using Language laboratory
Group discussion Resume writing Team Activity Public Speaking Text Books:

1. Developing Communication Skill : Krishna Mohan, MeeraBanerji,- MacMillan India Ltd.
2. B N Ghosh, : Managing Soft Skills for Persanality Development " Mc Graw Hill
3. Ethicsin Engineering Practiceand Research: Caroline Whitbeck, Cambridge University press
4. A Course In Communication Skills : Kiranmai Dutt , Cambridge University press
5. English for Business Communication : Simon Sweeney , Cambridge University Press
6. Basics Of Communication In English: Francis Sounderaj, MacMillan India Ltd.
7. Group Discussions and Interview Skills : Priyadarshi Patnaik , Cambridge University Press

8. Professional Presentations : Malcolm Goodale, Cambridge University Press
9. An Introduction to Professional English And Soft Skills : Das , Cambridge University Press

10. A practical course in Effective English speaking skills , G.K.Gangal, PHI Publication

MCAL101   Object Oriented Programming Lab

List of Experiment:

1.   Write a C++ program to find the sum of the given variables using function with default arguments.
2.   Write a C++ program to find the value of a number raised to its power using call by value.
3.   Write a C++ program to implement the concept of Call by Address.
4.   Write a program in C++ to implement the concept of call by reference.
5.   Write C++ program to implement inline function.
6.   Write a program in C++ to display product detail using classes with array as data members.
7.   Write a program in C++ implements the concept of class with constant data member.
8.   Write a program in C++ to implement the concept of class with static member functions.
9.   Write a C++ program to implement the friend function concept.
10.   a) Write a C++ program to implement the concept of unary operator overloading using c++.
    b) Write a C++ program to implement the concept of Binary operator overloading.
11.   Write a C++ program to implement the concept of Function Overloading.
12.   a) To implement single inheritance using c++.
    b) To write a C++ program to implement multiple inheritance.
    c) To write a C++ program to implement multilevel inheritance.
13.   a) Write a C++ program to implement the concept of class template.
    b) Write a C++ program for swapping two values using function templates

MCAL103   C Program Lab

List of Experiments on C:

1   Write a C program to find the sum of individual digits of a positive integer.
2   Write a C program to generate Fibonacci series.
3   Write a C program to generate all the prime numbers between 1 and n is a value supplied by the user.
4   Write a C program to find the roots of a quadratic equation.
5   Two integer operands and one operator form user, performs the operation and then prints the result.
6   Write a C program to find the factorial of a given integer by using recursive and non-recursive functions.
7   A C program to find both the largest and smallest number in list of integers
8   Write A C- Program To Determine If The Given String Is A Palindrome Or Not
9   Example of Array In C programming to find out the average of 4 integers
10   Write a program in c to Addition of two matrix in C
11   Write a C program to Implement the following searching method.
         i) linear search ii) Binary search
12   Write C programs that implement the following sorting methods to sort a given list of integers in ascending order by using Bubble sort

MCAL105   Database Management Systems Lab

AIM: The aim of this laboratory is to inculcate the abilities of applying the principles of the database management systems. This course aims to prepare the students for projects where a proper implementation of databases will be required.

Objectives of the course:

• To understand data definitions and data manipulation commands

• To learn the use of nested and join queries

• To understand functions, procedures and procedural extensions of data bases

• To be familiar with the use of a front end tool

• To understand design and implementation of typical database applications

LIST OF PROGRAMS:

1. Data Definition Commands, Data Manipulation Commands for inserting, deleting, updating
   and retrieving Tables and Transaction Control statements
2. Database Querying – Simple queries, Nested queries, Sub queries and Joins
3. Views, Sequences, Synonyms
4. Database Programming: Implicit and Explicit Cursors
5. Procedures and Functions
6. Triggers
7. Exception Handling
8. Database Design using ER modeling, normalization and Implementation for any application
9. Database Connectivity with Front End Tools
10. Case Study using real life database applications

SEMESTER-II

Core Java

MCAT201   **L-T-P(3-2-1)**   **Credit-4**

UNIT-I
Basics of Java : History and Basics of Java, Java Environment, JDK Tools, Java Virtual Machine, Java Program Structure, Java Language- Tokens, Keywords, Constants, Variables, and Data Types. Operators and Expressions, Statements - Decision Making, Branching and Looping, Labeled Loops Statement, Jump Statements: Break, Continue, and Return, CommandLine Argument.

UNIT-II
Classes and Objects: Classes, Objects, Defining a Class, Adding Variables and Methods, Creating Objects, Accessing Class Members, Constructors, Static Members, Nesting of Methods, Inheritance and Polymorphism: Basics Types, Extending a Class, Using Super, Method Overloading, Method Overriding, Final Variables and Methods, Final Classes, Finalize Method, Abstract Methods and Classes, Visibility Control.

UNIT-III
One and Two Dimension Arrays, String Array, String and String Buffer Classes, Vectors, Wrapper Classes. Interfaces: Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables, Packages: System Packages, Naming Conventions, Creating Packages, Accessing a Package, Using Package, Adding a Class to a Package, Hiding Classes. Exception Handling: Introduction to Exception Handling, Try-Catch, Finally, Throws, Java Thread Model: Life Cycle of a Thread, Thread Class, Runnable Interface

UNIT-IV
Applet Programming : Creating and Executing Java Applets, Inserting Applets in a Web Page, Applet Tag, Local and Remote Applets, Applets Vs. Applications, Applets Life Cycle. AWT Classes, Swing Classes, Event Handling, AWT Programming: Working with Windows, Graphics and Text, Using AWT Controls, Layout Managers and Menus, Handling Image, Animation, Sound and Video. Java Swing: Japplet, Icons and Labels, Text Fields, Buttons, Radio Buttons, Check Boxes, Combo Boxes, List Boxes, Tabbed and Scroll Panes, Tables. Event Handling:

UNIT-V
I/O Stream: Introduction of I/O Stream, Types of Streams, Stream Class Hierarchy, Using File Class, Byte Streams Vs Character Streams, Textfile Vs. Binary File, Standard I/O Streams, and Random Access File, Serialization. Database Programming Using JDBC:-Introduction to

JDBC, JDBC Drivers, Types of JDBC Drivers, Connecting with Database. J2EE: Introduction ofJ2EE, Web Application Basics, Architecture and Challenges of Web Application, Servlet, Servlet Life Cycle, Developing and Deploying Servlets.

Reference Books:

1. E. Balagurusamy, "Programming with Java, a Primer", TMH, ISBN-13: 978-0-07-061713-

2. Patrick Naughton and Herbert Schildt, "Java: the Complete Reference", TMH Publication.

3. Yashavant kanetkar, "Let us Java", BPB Publications.

5. Cay Horstmann, "Big Java", Wiley Publication

6. Peter Norton, "Java Programming", Techmedia Publications.

7. Joseph Weber, "Using Java 1.2", PHI

Data Structure and Algorithm

MCAT202   **L-T-P(3-1-1)**   **Credit-4**

UNIT-1
Introduction, classification, memory allocation, algorithm analysis, data structure operations, recursion, abstract data type (ADT).

UNIT II
Data structure representation, static and dynamic programming, Array, Array address calculation, sparse matrix, Linked list and their operations, singly linked list, doubly linked list, circular linked list, polynomials.

UNIT III
Linear Data structure, stack terminology, operation on stack, push and pop, applications of stack, infix, prefix and postfix notations, conversion and examples, Queue and its implementation, operations, types of queue, applications of queue.

UNIT IV
Non-linear data structure – Representation of graph, Graph Traversals - Depth-first traversal, breadth-first traversal, applications of graphs, Topological sort, shortest-path algorithms, minimum spanning tree – Dijkstra's, Prim's and Kruskal's algorithms, Tree introduction, tree representation, binary tree and its creation, tree traversal, binary search tree, B Tree, B+ tree, extended binary tree, Huffman algorithm coding.

UNIT V
Sorting techniques, Bubble, selection, insertion, quick, merge, heap sort, searching, linear andbinary search and hashing,

REFERENCES:
1. M. A. Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education Asia, 2013. 2. Tanaenbaum A.S.,Langram Y. Augestein M.J " Data Structures using C" Pearson Education , 2004
3. Anany Levitin "Introduction to the Design and Analysis of Algorithms" Pearson Education 2003.
4. E. Horowitz, S.Sahni and Dinesh Mehta, "Fundamentals of Data structures in C++", University Press, 2007.
5. E. Horowitz, S. Sahni and S. Rajasekaran, "Computer Algorithms/C++", Second Edition, University Press, 2007.
6. Reema Thareja, "Data Structures using C", Oxford Press, 2012.
7. V. Aho, J. E. Hopcroft, and J. D. Ullman, "Data Structures and Algorithms", Pearson

Education, 1983. 8. T. H. Cormen,

Computer Network

MCAT203   **L-T-P(3-0-1)**   **Credit-3**

UNIT 1

Introduction to Computer Network: Definition and uses of Computer Network, Criteria for a Data Communication Network, Classification of Computer Network, Network Architecture, OSI Reference Model, Data Communication Concepts and terminology, Transmission Impairments, Transmission Medium.

UNIT II

Data Encoding: Line Encoding, Types of Line Coding, Analog –to- Digital Conversion, Transmission Modes, Error Detection and Correction, Framing, Flow and Error Control

UNIT III

Error Correction and Detection Protocols: Protocols for Noiseless Channels, Protocols for Noisy Channels, High-level Data Link Control Protocol (HDLC), Point-to-Point Protocol (PPP), MAC and LLC Sub-layer.

UNIT IV

Wired LANs Ethernet: IEEE 802 Standards, Standard Ethernet, Changes in the Standard, Fast Ethernet, Gigabit Ethernet, Routing Characteristics, Routing Algorithms, Comparison of Routing Algorithms, Broadcast Routing, Multicast Routing, Routing in Ad Hoc Networks.

UNIT V

Network Layer: IP address Scheme, Subnet Addressing, Subnet Masks, IPV4 Addressing, IPV6 Addressing, Address Resolution Protocol (ARP), and Reverse Address Resolution Protocol (RARP). Services of Transport Layer, Connection Establishment, Connection Release, Transport Layer Protocols, Congestion, Simple Mail Transfer Protocol (SMTP), and Send mail Tool, File Transfer Protocol (FTP), Telnet Protocol.

UNIT VI

Internet and WWW: Internet Basics, Hypertext Transfer Protocol, World Wide Web(WWW), Security in Internet, E-mail Security.

Suggested References:

1. Kurose and Rose – "Computer networking -A top down approach featuring the internet" –Pearson Education
2. S. Keshav, An engineering approach to computer networking: ATM networks, the internet,and the telephone network, Addison-Wesley, 1997.
3. L. L. Peterson and B. S. Davie, Computer networks: a systems approach, 3rd Edition,

Morgan
Kaufmann Publishers, 2001.

Dot Net Technology

MCAT204   **L-T-P(3-0-1)**   **Credit-3**

UNIT-I
Introduction to .Net, .Net Framework Features & Architecture, CL, Common Type System, MSIL, Assemblies: Types of Assemblies, Class Libraries. Event Drive Programming, Methods and Events Related with Mouse and Keyboard. Programming into Visual Studio, Types of Project in .Net, IDE of VB.Net- Menu Bar, Toolbar, Project Explorer, Toolbox, Properties Window, Form Designer, Form Layout, Immediate Window, ASP& HTML Forms

UNIT- II
the VB.Net Language- Variables, Declaring Variables, Data Types, Scope & Lifetime of a Variable, Arrays, Types of Array, Control Array, Subroutine, Functions, Passing Argument to Functions, Optional Argument, Returning Value from Function. Control Flow Statements: Conditional Statement, Loop Statement. Forms: Loading, Showing and Hiding Forms, Working with Multiple Forms, Controlling one Form within Another, Overview of C#, Structure of C# Program, C# in .Net.

UNIT- III
GUI Programing with Windows Form with Properties, Methods and Events: Text Box Control, Label Control, Button Control, Listbox, Combo Box, Checked Box, Picture Box, Radio Button, Pannel, Scroll Bar, Timer Control, Adding Controls At Runtime, Common Dialog Control: File, Save, Print, Help. Designing Menus, MDI Forms, Overview of Dynamic Web Page, Asp.Net Controls, Applications, Web Servers, Web Form Controls, Server Controls, Client Controls Adding Controls to a Web Form, Form Validation Controls: Client Side Validation, Server Side Validation

UNIT- IV
ADO, .Net Architecture, Create Connection, Accessing Data Using Data Adapters and Datasets, Using Command & Data Reader, Data Bind Controls, Displaying Data in Data Grid. Data Form Wizard, Processing SQL& Access Database Using Ado.Net Object Model, Connection Object, Command Object, Add, Delete, Move & Update Records to Dataset, Executing Queries

UNIT- V
XML in .Net, XML Basics, Attributes, Fundamental Xml Classes: Document, Textwriter,Textreader, XML Validations, XML in ADO, .Net, the XMLdatadocument. Web Services: State Management- View State, Session State, Application State, Web Service Description Language, Building & Consuming a Web Service. Web Application Deployment,

Caching

Reference Books:

1. Steven HolznerVB.Net Programming-Black Book-Dreamtech Publications
2. Evangelos Petroutsos Mastering VB.Net - BPB Publications
3. Mathew Macdonald-The Complete Reference Asp.Net-TMH
4. Professional ASP.Net- Wrox Publication
5. Stephen Walther Active Server Pages 2.0 (Unleashed) -Techmedia
6. Eric a. Smith Asp 3 Programming Bible: IDG Books
7. C# Programming-Wrox Publication
8. Matt Telles-C# Programming Black Book-Dreamtech Publication

Operating System

MCAT205 **L-T-P(3-1-0)** **Credit-3**

UNIT I
Introduction to OperatingSystem : Introduction to operating system, its need and services; Operating system classification: Single user, Multi user, Simple batch processing, Multiprogramming, Multitasking, Parallel systems, Distributed system, Real time system; ProcessManagement: Process: Process state, Process control block, Threads; Process scheduling: Scheduling queues, Schedulers, Context switch; Operations on process: Process creation and termination; Inter process communication: Shared memory systems, Message passing systems; Process scheduling: CPU- I/O burst cycle, CPU scheduler, Pre-emptive and non pre-emptive scheduling; Scheduling algorithms: FCFS, SJFS, RRS, Priority scheduling, Multilevel queuescheduling, Multilevel feedback queue scheduling.

UNIT II
Synchronization: Critical section problem, Peterson's solution, Synchronization hardware, Semaphores: Mutual exclusion, Binary semaphores, Bounded concurrency, Producer-consumers, Reader-writers problem; Deadlocks & starvation, Problems of synchronization: Bounded buffer, dining philosophers; Monitors.
Deadlocks: System model, Deadlock characterization: Necessary conditions, Resource allocation graph, Method for handling deadlock; Deadlock prevention: Mutual exclusion, Hold and wait, No preemption, Circular wait, Deadlock avoidance: Safe state, Resource allocation graph algorithm, Banker's algorithm; Deadlock detection, Recovery from deadlock.

UNIT III
MemoryManagement-I : Static and dynamic memory allocation, Memory allocation to process: Stacks, Heap, Memory allocation model; Reuse of memory: Performing fresh allocations using a free list, Memory fragmentation, Merging free areas; Contiguous memory allocation: Fragmentation, Swapping;
MemoryManagement-II: Paging : Hardware support, Protection, shared pages, Techniques for structuring of page table, Memory mapped files; Segmentation, Demand paging, Page replacement Algorithms: FIFO, Optimal, LRU, Counting based page replacement; Thrashing.

UNIT IV

Storage ManagementI: File Concept: Attributes, Operations, Types, Structure; Access methods: Sequential and direct access, Index ; Directory structure: Single level, Two Level, Tree Structured, acyclic Graph directories; File System mounting, File sharing, Protection: Types of access, access Control.

Storage ManagementII : File system structure, File system implementation, Directory implementation, Allocation methods, Free space management, Disk scheduling: FCFS, SSTF, SCAN, C-SCAN,LOOK, C-LOOK; Disk management, Swap space management, RAID.

Suggested Readings:

1. Peterson, James, L. and Silberschatz, A., 1985: Operating System Concepts, Wiley Publ. Comp.
2. Dhamdhere, D M: Operating Systems-A concept based approach, Mc GrawHill.
3. Deitel, H.M., 1984: An Introduction to Operating System, Addison-Wesley Publ.Comp.
4. Milenkovic, M., 1987: Operating System – Concepts and Design, McGraw Hill InternationalEditions.
5. Richie: Operating System,BPB.
6. Hansen Per Brineh, 1978: Operating System Principles, Prentice HallIndia.
7. Madnick and Donovan: Operating System, McGraw Hill BookCo.
8. Joshi, R.C.: Operating Systems, Wiley India Pvt.Ltd.

Accounting & Financial Management

MCAT206   **L-T-P(2-0-0)**   **Credit-2**

UNIT -I

Basic of Accounting, Accounting Mechanics- Double Entry System, Classification, Rules for Debitand Credit Concepts & Conventions, Indian Accounting Standards.

UNIT -II

Journal: Meaning of Journal, Advantages, Subdivision. Ledger : Meaning, subdivision, Mechanics of Posting, balancing of Ledger accounts .Trial Balance: Objectives, Defects of trial balance, Errorsdisclosed by trial balance, preparation and locating errors.

UNIT –III

Cash Book and Subsidiary books of Accounting: Kinds of cashbook, Purchase daybook, Sales daybook, Bills receivable book, Bills payable book. Finance Accounts: Trading account,, Profit & Loss account, Adjustments, Balance Sheet, Forms of balance Sheet, Assets and their classification, liabilities and their classification, uses and limitations.

UNIT -IV

Capital & Revenue Expenditure & Receipts: Rules for determining capital expenditure, Deferred Revenue expenditure, Capital & Revenue receipts, Capital & Revenue Profits, Capital & Revenue Loss. Nature of Financial Management: Scope of financial functions, finance functions and job of finance manager, organization of finance function.

Suggested Reading:

1. Management Accounting – Manmohan Singh and Goel
2. Financial management- Pandey I. M.
3. Hanif & Mukherjee-Modern Accountancy, TMH, New Delhi.
4. Maheshwari & Maheshwari- An Introduction to Accountancy, Vikas
Publishing HousePvt.Ltd., New Delhi.

MCAL201   **Core Java Lab**

List of Experiments on Java:

1   Write a java program to find the Fibonacci series using recursive and non-recursive functions.

2   Write a java program to multiply two given matrices.

3   Write a java program for Method overloading and Constructor overloading.

4   Write a java program to display the employee details using Scanner class.

5   Write a java program that checks whether a given string is palindrome or not.

6   Write a java program to represent Abstract class with example.

7   Write a java program to implement Interface using extends keyword.

8   Write a java program to create inner classes.

9   Write a java program for creating multiple catch blocks.

10 Write a Java program that implements a multi-thread application that has three threads.

11 Write an applet program that displays a simple message.

12 Write a Java program compute factorial value using Applet.

13 Write a program for passing parameters using Applet.

14 Write a java program for handling Mouse events and Key events.

15 Write a java program that connects to a database using JDBC.

16 Write a java program that works as a simple calculator. Use a Grid Layout to arrange Buttons for digits and for the + - * % operations. Add a text field to display the result.

MCAL202   Data Structures & Algorithms Lab

Objectives of the course:

- To implement linear and non-linear data structures
- To understand the different operations of search trees
- To implement graph traversal algorithms
- To get familiarized to sorting and searching algorithms

LIST OF EXPERIMENT

1   Array Implementation of List ADTs
2   Linked List Implementation of List ADTs
3   Array Implementation of Stack ADTs
4   Linked List Implementation of Stack ADTs
5   Array Implementation of Queue ADTs
6   Linked List Implementation of Queue ADTs
7   Linear Search
8   Binary Search
9   Bubble Sort
10 Insertion Sort

MCAL203   **Computer Networks Lab**

LIST OF EXPERIMENT

1   Study of different types of Network cables and practically implement the cross-wired
    cable and straight through cable using clamping tool.
2   Study of Network Devices in Detail.
3   Study of network IP.
4   Connect the computersin Local Area Network.
5   Study of basic network command and Network configuration commands.
6   Configure a Network topology using packet tracer software.
7   Configure a Network topology using packet tracer software.
8   Configure a Network using Distance Vector Routing protocol.
9   Configure Network using Link State Vector Routing protocol.

MCAL204   **Dot Net Lab**

LIST OF EXPERIMENT

1 Program to display the addition, subtraction, multiplication and division of two number using console application.
2 Program to display the first 10 natural numbers and their sum using console application.
3 Program to display the addition using the windows application.
4 Write a program to convert input string from lower to upper and upper to lower case.
5 Write a program to simple calculator using windows application.
6 Write a program working with Page using ASP.Net.
7 Write a program working with forms using ASP.NET.
8 Write a program to connectivity with Oracle database.
9 Write a program to access data source through ADO.NET.
10 Write a program to manage the session.

Design and Analysis of Algorithms

MCAT301   **L-T-P(3-1-0)**   **Credit-3**

Objectives of the course
- Analyze the asymptotic performance of algorithms.
- Write rigorous correctness proofs for algorithms.
- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations.

UNIT I

INTRODUCTION

Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade- offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursiontree method and Masters" theorem.

UNIT II

FUNDAMENTAL ALGORITHMIC STRATEGIES

Brute-Force, Greedy,Dynamic Programming, Branch- and-Bound and Backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving , Bin Packing, Knap Sack TSP. Heuristics – characteristics and their applicationdomains.

UNIT III

GRAPH AND TREE ALGORITHMS

Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.

UNIT IV

TRACTABLE AND INTRACTABLE PROBLEMS

Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Cook"s theorem, Standard NP-complete problems and Reduction techniques.

UNIT V
ADVANCED TOPICS

Approximation algorithms, Randomized algorithms, Class of problems beyond NP-P SPACE

TEXT BOOKS:
1. Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald LRivest and Clifford Stein, MIT Press/McGraw-Hill.
2. Fundamentals of Algorithms – E. Horowitz et al.

REFERENCES:
1. Algorithm Design, 1ST Edition, Jon Kleinberg and ÉvaTardos, Pearson.
2. Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Michael TGoodrich and Roberto Tamassia, Wiley.
3. Algorithms -- A Creative Approach, 3rd Edition, UdiManber, Addison-Wesley, Reading, MA.

Software Engineering

MCAT302   **L-T-P(3-0-0)**   **Credit-3**

UNIT I

Introduction of Software Engineering & Software Life Cycle Models/W Engineering Discipline-Evolution and Impact, Emergence of S/W Engineering, Waterfall Model, Prototyping Model, Evolutionary Model Spiral models and their comparisons.

UNIT II

Software Project Management & Requirements Analysis and Specification, Project Manager Responsibilities, Project Planning, Project Size estimation Metrics, Project estimation Techniques, COCOMO, Staffing Level Estimation, Scheduling, Organization & Team Structures, Staffing, Risk Management,S/W Configuration Management, requirement Gathering and Analysis, Software Requirement Specification, Formal System Development Techniques

UNIT III

Software Design & Function-Oriented S/W Design, Overview of Software Design, Cohesion and Coupling, S/W Design Approaches, Object-Oriented vs. Function-Oriented Design, SA/SD Methodology, Structured Analysis, Data Flow Diagrams(DFDs), Structured Design, Detailed Design, Design Preview

UNIT IV

Object Modelling Using UML & Object-Oriented Software Development , UML, UML Diagrams, Use Case Model, Class Diagrams, Design Patterns, Object-Oriented analysis and Design Process, OOD Goodness Criteria

UNIT V

User Interface Design & Coding and Testing, Basic Concepts, Types, Components Based GUI, Development, User Interface Design Methodology, Coding, Code Review, Unit Testing, Black Box, Testing, White-Box Testing, Debugging, Program Analysis Tools, Integration Testing, System Testing, Software Reliability and Quality Management & Software Maintenance, S/W Reliability, Statistical , Testing, S/W Quality, Management System, ISO 9000, SEI CMM, S/W Reverse Engineering, S/W, Maintenance Process Models,

Textbooks:
1. R. S. Pressman, Software Engineering: A Practitioners Approach, McGraw Hill.
2. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
3. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age

InternationalPublishers.

4. Pankaj Jalote, Software Engineering, Wiley

Advance Java

MCAT303   **L-T-P(3-2-2)**   **Credit-3**

UNIT-I
Servlets: Servlet Structure, Servlet packaging, HTMLbuilding utilities, Lifecycle, Single Threadmodel interface, Handling Client Reques t : Form Data, Handling Client Request:HTTP Request Headers. Generating server Response: HTTP Status codes, Generatingserver Response: HTTP Response Headers, Handling Cookies, Session Tracking.

UNIT-II
JSP : Overview of JSP Technology, Need of JSP, Benefits of JSP, Advantages of JSP,Basic syntax, Invoking java code with JSP scripting elements, creating Template Text,Invoking java code from JSP, Limiting java code in J S P , using jsp expressions,comparing servlets and jsp, writing scriptlets. For example Using Scriptlets to make partsof jsp conditional, using declarations, declaration example. Controlling the Structure ofgenerated servlets: the JSP pagedirective, import attribute, session attribute, isElignoreattribute, buffer and auto flush attributes, info attribute ,errorPage and is errorPageattributes, is Thread safe Attribute, extends attribute, language attribute, Including files andapplets in jsp Pages, using java beans components in JSP documents

UNIT-III
Java Beans & Annotations: Creating Packages, Interfaces, JAR files and Annotations. The core java API package, Newjava. Lang Sub package, Built-in Annotations. Working with Java Beans. Introspection, Customizers, creating java bean, manifest file, Bean Jar file, new bean, adding controls, Beanproperties, Simple properties, Design Pattern events, creating bound properties, BeanMethods, Bean an Icon, Bean info class, Persistence ,Java Beans API.

UNIT-IV
JDBC: Talking to Database, Immediate Solutions, Essential JDBC program, using preparedStatement Object, Interactive SQL tool. JDBC in Action Result sets, Batch updates,Mapping, Basic JDBC data types, Advanced JDBC data types,immediate solutions.

UNIT-V
Introduction to EJB: The Problem domain, Breakup responsibilities, CodeSmart not hard, the Enterprise java beanspecification. Components Types. Server Side Component Types, Session Beans, MessageDriven Beans, Entity Beans, The Java Persistence Model. Container services. DependencyInjection, Concurrency, Instance pooling n caching, Transactions, security, Timers,Naming and object stores, Interoperability, Life Cycle Callbacks, Interceptors, platformintegration. Developing your first EJB. preparation, Definitions, naming conventions,convention for the Examples, coding the EJB, the contract, the bean

Implementation class,out of Container Testing, Integration Testing.

Reference Books:

1. E. Balagurusamy, "Programming with Java, a Primer", TMH, ISBN-13: 978-0-07-061713-

2. Patrick Naughton and Herbert Schildt, "Java: the Complete Reference", TMH Publication.

3. Yashavant kanetkar, "Let us Java", BPB Publications.

5. Cay Horstmann, "Big Java", Wiley Publication

6. Peter Norton, "Java Programming", Techmedia Publications.

7. Joseph Weber, "Using Java 1.2", PHI

Data Mining

MCAT304   **L-T-P(3-0-0)**   **Credit-3**

Objective: To introduce students to the basic concepts and techniques of Data Mining, to develop skills of using recent data mining software for solving practical problems And to gainexperience of doing independent study and research.

UNIT-I
Introduction to Data Mining : What is data mining?; Related technologies - Machine Learning, DBMS, OLAP, Statistics; Data Mining Goals; Stages of the Data Mining Process; Data Mining Techniques ; Knowledge Representation Methods; Applications ;Example: weather data .

UNIT-II
Data Warehouse and OLAP: Data Warehouse and DBMS; Multidimensional data model ; OLAP operations ;Example: loan data set. Data preprocessing: Data cleaning ; Data transformation; Data reduction; Discretization and generating concept hierarchies ; Installing Weka 3 Data Mining System ; Experiments with Weka - filters, discretization .

UNIT-III
Data Mining Primitives, Primitives, Languages and System Architectures : Data Mining Primitives, Data Mining query language, Designing GUI on a Data Mining query language, Architectures of Data Mining System.

UNIT-IV
Mining Association rules in large database: Association rules mining, Mining single-dimensional Boolean Association rules from transaction database, mining multilevel Association rules from transaction database, Mining multidimensional Association rules from relational databases and Data warehouses, Association mining to correlation analysis, Constraint based association mining.

UNIT-V
Classification and Prediction : What is classification and prediction, Issues regarding classification and prediction, Classification by decision tree Induction, Bayesian Classification, Classification by Back propagation, Classification based on concepts from association rule mining, Prediction, Classification accuracy. luster Analysis: What is cluster analysis, Types of data in cluster analysis, Acategorization of major clustering methods, Partitioning methods, Hierarchical Methods, Density based methods, Grid based methods, Model based clustering methods.

Suggested Readings/ References:-

1. Data Mining Concepts and Techniques by Jiawei Han, Micheline Kamber, Elsevier.
2. Data Mining. A tutorial-based Primer by Roiger, Michael W. Geatz and Pearson Education.
3. Data Mining Introductory & advanced topic by Margaret H. Durham , Pearson Education

Python Programming

MCAT305   **L-T-P(3-0-2)**   **Credit-3**

Objectives of the course

- To know the basics of algorithmic problem solving
- To read and write simple Python programs.
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures –- lists, tuples, dictionaries.
- To do input/output with files in Python.

UNIT I
ALGORITHMIC PROBLEM SOLVING

Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in arange, Towers of Hanoi.

UNIT II
DATA, EXPRESSIONS, STATEMENTS

Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III
CONTROL FLOW, FUNCTIONS

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability,string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.+

UNIT IV

LISTS, TUPLES, DICTIONARIES

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, merge sort, histogram.

UNIT V

FILES, MODULES, PACKAGES

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copyfile.

COURSE OUTCOMES:
- Upon completion of the course, students will be able to
- Develop algorithmic solutions to simple computational problems
- Read, write, execute by hand simple Python programs.
- Structure simple Python programs for solving problems.
- Decompose a Python program into functions.
- Represent compound data using Python lists, tuples, dictionaries.
- Read and write data from/to files in Python Programs.

TEXT BOOKS:
1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist„„„, 2nd edition, Updated for Python 3, Shroff/O„Reilly Publishers, 2016 (http://greenteapress.com/wp/think- python/)
2. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

REFERENCE BOOKS:
1. John V Guttag, —Introduction to Computation and Programming Using Python„„„, Revised andexpanded Edition, MIT Press , 2013
2. Robert Sedgewick, Kevin Wayne, Robert Dondero, —Introduction to Programming in Python:An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
3. Timothy A. Budd, —Exploring Python‖, Mc-Graw Hill Education (India) Private Ltd.,, 2015.
4. Kenneth A. Lambert, —Fundamentals of Python: First Programs‖, CENGAGE Learning, 2012.
5. Charles Dierbach, —Introduction to Computer Science using Python: A ComputationalProblem-Solving Focus, Wiley India Edition, 2013.

6. Paul Gries, Jennifer Campbell and Jason Montojo, —Practical Programming:

ELECTIVE

Artificial Intelligence

MCAT306   **L-T-P(4-0-0)**   **Credit-4**

UNIT I

Introduction, What is Artificial Intelligence, I Technique, Level of the Model, Problem Spaces, and Search, Defining the Problem as a State Space Search, Production Systems, Problem, Characteristics, Production System Characteristics, Issues in the Design of Search Programs, Heuristic Search Techniques: Generate-and-Test, Hill Climbing, Best-first Search, Problem Reduction, Constraint Satisfaction, Means-end Analysis, nowledge, Means-ends Analysis, Knowledge

UNIT I I

Using Predicate Logic,Representing Simple Facts in Logic,Representing , Instance and ISA Relationships, Computable Functions and Predicates, Resolution, Natural Deduction, Introduction to Nonmonotonic Reasoning, Logics for Nonmonotonic Reasoning, Implementation Issues, Augmenting a Problem-solver, Depth-first Search, Breadth-first Search, Semantic Nets, Frames, Conceptual DependencyScripts, Weak and Strong Slot-and-Filler Structures: Semantic

UNIT III

Game Playing, The Minimax Search Procedure, Adding Alpha-beta Cutoffs, Iterative Deepening, The Blocks World, Components of a Planning System, Components of a Planning System, Goal Stack Planning, Nonlinear Planning Using Constraint Posting, Hierarchical Planning Other Planning Techniques. What is Understanding, What Makes Understanding Hard? Understanding as Constraint Satisfaction

UNIT I V

Learning, Rote Learning, Learning by Taking Advice, Learning by Taking Advice, Learning in Problem-solving, Learning, Learning from Examples: Induction, Explanation-based Learning, Discovery, Analogy, Formal Learning Theory, Neural Net Learning and Genetic Learning

UNIT V

Expert Systems, Representing and Using Domain Knowledge, Expert System Shells Knowledge Acquisition

REFERENCES:
   1. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", Pearson Education

   K. K. UNIVERSITY, NEPURA, BERAUTI, BIHAR SHARIF, NALANDA, BIHAR –803115

2. Elaine Rich and Kevin Knight, "Artificial Intelligence", McGraw-Hill
3. E Charniak and D McDermott, "Introduction to Artificial Intelligence", Pearson Education
4. Dan W. Patterson, "Artificial Intelligence and Expert Systems", Prentice Hall of India,

Parallel Computing

MCAT307   **L-T-P(4-0-0)**   **Credit-4**

Objectives

- To study the scalability and clustering issues and the technology necessary for them.
- To understand the technologies enabling parallel computing.
- To study the different types of interconnection networks.
- To study the different parallel programming models.
- To study the software support needed for shared memory programming.

UNIT I
Scalability And Clustering: Evolution of Computer Architecture – Dimensions of Scalability – Parallel Computer Models – Basic Concepts Of Clustering – Scalable Design Principles – Parallel Programming Overview – Processes, Tasks and Threads – Parallelism Issues – Interaction / Communication Issues –Semantic Issues In Parallel Programs.

UNIT II
Enabling Technologies : System Development Trends – Principles of Processor Design – Microprocessor, Architecture Families – Hierarchical Memory Technology – Cache Coherence Protocols – Shared Memory Consistency – Distributed Cache Memory Architecture – Latency Tolerance Techniques – Multithreaded Latency Hiding.

UNIT III
System Interconnects: Basics of Interconnection Networks – Network Topologies and Properties – Buses, Crossbar and Multistage Switches, Software Multithreading – Synchronization Mechanisms.

UNIT IV
Parallel Programming: Paradigms And Programmability – Parallel Programming Models – Shared Memory Programming.

UNIT V
Message Passing Programming:
Message Passing Paradigm – Message Passing Interface – Parallel Virtual Machine.

TEXT BOOK
K. K. UNIVERSITY, NEPURA, BERAUTI, BIHAR SHARIF, NALANDA, BIHAR –803115

1. Kai Hwang and Zhi.Wei Xu, "Scalable Parallel Computing", Tata McGraw-Hill, New Delhi, 2003.

REFERENCES

1. David E. Culler & Jaswinder Pal Singh, "Parallel Computing Architecture: A Hardware/Software Approach", Morgan Kaufman Publishers, 1999.

2. Michael J. Quinn, "Parallel Programming in C with MPI & OpenMP", Tata McGraw-Hill, New Delhi, 2003.

3. Kai Hwang, "Advanced Computer Architecture" Tata McGraw-Hill, New Delhi, 2003.

Cyber Security

MCAT308   **L-T-P(4-0-0)**   **Credit-4**

Course Objective:
This course provides the foundation for understanding the key issues associated with protecting, information assets. The purpose of the course is to provide the student with an overview of the field of information security and assurance.

UNIT I
Introduction: Introduction to Cyber Security - Importance and challenges in Cyber Security - Cyberspace – Cyber threats - Cyber warfare - CIA Triad - Cyber Terrorism - Cyber Security of Critical Infrastructure -Cyber security -Organizational Implications.

UNIT II
Hackers and Cyber Crimes
Types of Hackers - Hackers and Crackers - Cyber-Attacks and Vulnerabilities - Malware threats -Sniffing - Gaining Access - Escalating Privileges - Executing Applications - Hiding Files – Covering Tracks - Worms - Trojans - Viruses – Backdoors

UNIT III
Ethical Hacking and Social Engineering
Ethical Hacking Concepts and Scopes - Threats and Attack Vectors - Information Assurance – Threat Modeling - Enterprise Information Security Architecture - Vulnerability Assessment and Penetration, Testing - Types of Social Engineering - Insider Attack - Preventing Insider Threats – Social Engineering Targets and Defence Strategies.

UNIT IV
Cyber Forensics and Auditing
Introduction to Cyber Forensics - Computer Equipment and associated storage media - Role of forensics Investigator - Forensics Investigation Process - Collecting Network based Evidence - Writing Computer, Forensics Reports - Auditing - Plan an audit against a set of audit criteria - Information Security, Management System Management. Introduction to ISO 27001:2013.

UNIT V
Cyber Ethics and Laws
Introduction to Cyber Laws - E-Commerce and E-Governance - Certifying Authority and Controller -Offences under IT Act- Computer Offences and its penalty under IT Act 2000 - Intellectual Property Rights in Cyberspace.

Books for References:

1. Donaldson, S., Siegel, S., Williams, C.K., Aslam, A., "Enterprise Cyber security -How to Build a Successful Cyber defense Program against Advanced Threats", Apress, 1st Edition, 2015.
2. Nina Godbole, Sumit Belapure, "Cyber Security", Willey, 2011.
3. Roger Grimes, " Hacking the Hacker" , Wiley, ist Edition, 2017.
4. Cyber Law By Bare Act, Govt of India, It Act 2000

Cloud Computing

MCAT309   **L-T-P(4-0-0)**   **Credit-4**

Objective, scope and outcome of the course.

UNIT -I
Introduction: Objective, scope and outcome of the course. Introduction Cloud Computing: Nutshell of cloud computing, Enabling Technology, Historical development, Vision, feature Characteristics and components of Cloud Computing. Challenges, Risks and Approaches of Migration into Cloud. Ethical Issue in Cloud Computing, Evaluating the Cloud's Business Impact and economics, Future of the cloud. Networking Support for Cloud Computing. Ubiquitous Cloud and the Internet of Things

UNIT -II
Cloud Computing Architecture: Cloud Reference Model, Layer and Types of Clouds, Services models, Data centre Design and interconnection Network, Architectural design of Compute and Storage Clouds. Cloud Programming and Software: Fractures of cloud programming, Parallel and distributed programming paradigms-Map Reduce, Hadoop, High level Language for Cloud. Programming of Google App engine.

UNIT -III
Virtualization Technology: Definition, Understanding and Benefits of Virtualization. Implementation Level of Virtualization, Virtualization Structure/Tools and Mechanisms, Hypervisor VMware, KVM, Xen. Virtualization: of CPU, Memory, I/O Devices, Virtual Cluster and Resources Management, Virtualization of Server, Desktop, Network, and Virtualization of data-centre.

UNIT -IV
Securing the Cloud: Cloud Information security fundamentals, Cloud security services, Design principles, Policy Implementation, Cloud Computing Security Challenges, Cloud Computing Security Architecture . Legal issues in cloud Computing. Data Security in Cloud: Business Continuity and Disaster Recovery , Risk Mitigation , Understanding and Identification of Threats in Cloud, SLA-Service Level Agreements, Trust Management

UNIT -V
Cloud Platforms in Industry: Amazon web services , Google AppEngine, Microsoft Azure Design, Aneka: Cloud Application Platform -Integration of Private and Public Clouds Cloud applications: Protein structure prediction, Data Analysis, Satellite Image Processing, CRM

Text & References:

Text:

- Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter,

     TATA McGraw- Hill , New Delhi – 2010

- Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate

     Online - Michael Miller - Que 2008

References:

- Cloud computing for dummies- Judith Hurwitz , Robin Bloor , Marcia Kaufman ,Fern Halper, Wiley Publishing, Inc, 2010
- Cloud Computing (Principles and Paradigms), Edited by Rajkumar Buyya, James Broberg,

     Andrzej Goscinski, John Wiley & Sons, Inc. 2011

MCAL301   **Design and Analysis of Algorithm Lab**

LIST OF EXPERIMENT

1   Implementation of Binary search algorithm using Divide & Conquer method.
2   Implementation of Quick Sort algorithm using Divide & Conquer method.
3   Program to merge two sorted arrays.
4   Implementation of Merge Sort algorithm using Divide & Conquer method.
5   Implementation of Strassen's Matrix multiplication.
6   Program to implement knapsack problem using greedy method.
7   Program to implement job sequencing with deadlines using greedy method.
8   Implementation of travelling salesman problem.
9   Program to implement 8-queens problem using backtrack method.
10   Implement All-Pairs Shortest Paths Problem using Floyd's algorithm.

MCAL303   **Advance Java Lab**

LIST OF EXPERIMENT

1 Experiment : JDBC Programs using Statement
    1.1   A program to test the connection with the database
    1.2 A program to create a table
    1.3 A program to insert record in a table
    1.4 A program to update record in a table
    1.5 A program to delete record from a table

2 Experiment : Servlet Programming
    2.1 Servlet Execution on tomcat
    2.2 A servlet program to print hello world
    2.3 A servlet program to display request details
    2.4 A servlet program to handle user form

3 Experiment : JSP Programming
    3.1 JSP program to display hello world. 16
    3.2 JSP program to demonstrate arithmetic operations 17
    3.3 JSP program to demonstrate jsp:forward action tag 18
    3.4 Developing a web application to insert record into Oracle Database using JSP and JDBC

MCAL305   **Python Programming Lab**

LIST OF EXPERIMENT

1   Write a program to demonstrate different number data types in python(script.py)
2   Write a program to perform different arithmetic operations on numbers in python
3   Write a program to create, concatenate and print a string and accessing sub-string from given string
4   Write a python script to print the current date in the fallowing format" Sun May 29 02:26:23 IST 2017"
5   Write a program to create, append and remove lists in python
6   Write a program to demonstrate working with tuples in python
7   Write a program to demonstrate working with dictionaries in python
8   Program to find the largest number among the three input numbers
9   Program to convert temperature in Celsius to Fahrenheit
10 Write a python program to construct the following pattern, using a nested for loop
11 Write a python script that prints prime numbers less than 20
12 Write a python program to find the factorial of a number using recursion
13 write a program that accepts the lengths of three sides of a triangle as input the program output should indicate whether or not the triangle, is right triangle(recall from the Pythagorean theorem that in a right triangle, the square of one side equals the sum of the squares of the other two
sides)
14 Write a python class to implement pow(x, n)
15 Write a python class to reverse a string word by word.

SEMESTER-IV

MCAL401   **L-T-P(20-0-0)**   **Credit-20**

Dissertation (Major Project)

MCAL402   **L-T-P(4-0-0)**   **Credit-4**

Seminar