MANGALORE UNIVERSITY

Credits, Scheme of Examination and Syllabus for

Master of Computer Applications (MCA) Degree Programme

Choice Based Credit System (CBCS) (2017-18 onwards)

Department of Post-Graduate Studies and Research in Computer Science, Mangalore University
Mangalagangothri-574199
October 2016

I SEMESTER M.C.A.								
Subject Code	**Subjects**	**Theory Hours/ Week**	**Practical Hours/ Week**	**Duration of exams (Hours)**	**Marks & Credits**			
					IA	**Exam**	**Total**	**Credits**
HARD CORE								
MCAH101	Discrete Mathematical Structures	4L	-	3	30	70	100	4
MCAH102	Digital Computer Fundamentals	4L	-	3	30	70	100	4
MCAH103	Microprocessors and Peripherals	4L	-	3	30	70	100	4
MCAH104	Object Oriented Programming Using C++	4L	-	3	30	70	100	4
SOFT CORE								
MCAS105	Web Programming	4L	-	3	30	70	100	4
MCAP106	OOP Lab		4	3	30	70	100	2
MCAP107	Web Programming Lab		4	3	30	70	100	2
	Total	**20**	**8**	**21**	**210**	**490**	**700**	**24**

II SEMESTER M.C.A.								
Subject Code	**Subjects**	**Theory Hours/ Week**	**Practical Hours/ Week**	**Duration of exams (Hours)**	**Marks & Credits**			
					IA	**Exam**	**Total**	**Credits**
HARD CORE								
MCAH201	Advanced Operating System	4L	-	3	30	70	100	4
MCAH202	System Software	4L	-	3	30	70	100	4
MCAH203	Data Communications and Computer Networks	4L	-	3	30	70	100	4
MCAH204	Advanced Data Structures	4L	-	3	30	70	100	4
SOFTCORE								
MCAS205	Java Programming	4L	-	3	30	70	100	4
MCAP206	Advanced Data Structures Lab	-	4	3	30	70	100	2
MCAP207	Java Programming Lab	-	4	3	30	70	100	2
	Total	**20**	**8**	**21**	**210**	**490**	**700**	**24**

III SEMESTER M.C.A.								
Subject Code	**Subjects**	**Theory Hours/ Week**	**Practical Hours/ Week**	**Duration of exams (Hours)**	**Marks & Credits**			
					IA	**Exam**	**Total**	**Credits**
HARD CORE								
MCAH301	Advanced Database Management Systems	4L	-	3	30	70	100	4
MCAH302	Object Oriented Data Modeling Using UML	4L	-	3	30	70	100	4
MCAH303	Computer Graphics and Multimedia	4L	-	3	30	70	100	4
MCAH304	.Net Technology	4L	-	3	30	70	100	4
SOFT CORE								
MCAS305	Advanced Java Programming	4L	-	3	30	70	100	4
MCAP306 MCAP307	.NET Technology Lab DBMS LaB	-	4	3	30	70	100	2
MCAP308 MCAP309	Computer Graphics Lab UML Modeling Lab	-	4	3	30	70	100	2
Total		**20**	**8**	**21**	**210**	**490**	**700**	**24**

IV SEMESTER M.C.A.								
Subject Code	**Subjects**	**Theory Hours/ Week**	**Practical Hours/ Week**	**Duration of exams (Hours)**	**Marks & Credits**			
					IA	**Exam**	**Total**	**Credits**
HARD CORE								
MCAH401	Software Engineering	4L	-	3	30	70	100	4
MCAH402	Distributed Computing	4L	-	3	30	70	100	4
MCAH403	Advanced Web Programming	4L	-	3	30	70	100	4
SOFTCORE								
MCAS404 MCAS405 MCAS406 MCAS407	Advanced Computer Network Image Processing Software Architecture Mobile Computing	4L	-	3	30	70	100	4
MCAS408 MCAS409 MCAS410 MCAS411	Wireless Communications Software Testing and Automation E-Commerce Operational Research	4L	-	3	30	70	100	4
MCAP412 MCAP413 MCAP414	Distributed Computing Lab Computer Network Lab Image Processing Lab	-	4	3	30	70	100	2
MCAP415 MCAP416 MCAP417	Advanced Web Programming Lab E Commerce Lab Operational Research Lab	-	4	3	30	70	100	2
Total		**20**	**8**	**21**	**260**	**490**	**700**	**24**

V SEMESTER M.C.A.								
Subject Code	**Subjects**	**Theory Hours/ Week**	**Practical Hours/ Week**	**Duration of exams (Hours)**	**Marks & Credits**			
					IA	**Exam**	**Total**	**Credits**
HARD CORE								
MCAH501	Data Mining Techniques	4L	-	3	30	70	100	4
MCAH502	Python Programming	4L	-	3	30	70	100	4
MCAH503	Android Applications Development	4L	-	3	30	70	100	4
SOFT CORE								
MCAS504 MCAS505 MCAS506 MCAS507	Big Data Analytics Cloud and Grid Computing Machine Learning Internet of Things	4L	-	3	30	70	100	4
MCAS508 MCAS509 MCAS510 MCAS511	Cryptography and Network Security Natural Language Processing Embedded Systems Artificial Intelligence	4L	-	3	30	70	100	4
MCAP512 MCAP513 MCAP514	Data Mining Lab Python Programming Lab Data Analytics Lab	-	4	3	30	70	100	2
MCAP515 MCAP516 MCAP517	Android Applications Lab Machine Learning Lab Artificial Intelligence Lab	-	4	3	30	70	100	2
Total		**20**	**8**	**21**	**260**	**490**	**700**	**24**

VI SEMESTER M.C.A.								
Subject Code	**Subjects**	**Theory Hours/ Week**	**Practical Hours/ Week**	**Duration of exams (Hours)**	**Marks & Credits**			
					IA	**Exam**	**Total**	**Credits**
MCAH601	Major Project Internal Assessment Project Report Valuation	-	40	----- -----	120 --	-- 200	120 200	16
	Viva-Voce	-	-	-	--	80	80	-
Total			**40**		**120**	**280**	**400**	**16**

Grand Total Marks of all the SIX Semesters: 3900

Total Number of Credits: 136, Hard Core (88 Credits): 64.71% and Soft Core (48 Credits): 35.29%

MCAH101: DISCRETE MATHEMATICAL STRUCTURES

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

12 Hours

UNIT-I

Logic: Introduction, propositional logic, propositional equivalences, predicates and quantifiers, rules of inference.

Proofs: Introduction to proofs, proof methods.

12 Hours

UNIT-II

Sets, Functions and Relations: Sets, set operations, functions, relations, equivalence relations and partial ordering.

Counting: Basics of counting, the pigeonhole principle, permutations and combinations, Binomial Co-efficient, recurrence relations.

12 Hours

UNIT-III

Probability: Introduction to probability, axioms of probability, independence and conditional Probability, inclusion-exclusion principle.

UNIT-IV **12 Hours**

Graph Theory: Graphs, terminology and special types of graphs, representation of graphs,Isomorphism, connectivity, Euler and Hamiltonian paths, shortest path problems, Planar graphs, graph coloring.

REFERENCE BOOKS

1. Kenneth H Rosen, **Discrete Mathematics and its Applications**, McGraw Hill, 2011, 7th edition.
2. Ralph P. Grimaldi and B V Ramana, **Discrete and Combinatorial Mathematics: An Applied Introduction**,Pearson, 2011, 5th edition.
3. NarsinghDeo, **Graph Theory with Applications to Engineering and Computer Science**,Prentice Hall India, 2004.
4. J. P. Tremblay and R. Manohar, **Discrete Mathematical Structures with Applications to Computer Science**, McGraw Hill

MCAH102 : DIGITAL COMPUTER FUNDAMENTALS

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I **12 Hours**

Computer Operation – Application of Computers to Problems, Scientific Applications, Business Applications, Components of Digital computer, Number Systems – Decimal, binary, octal and hexadecimal Number systems, Number Base Conversion, Binary addition and subtraction, Complements, BCD, negative number representation and operations, floating point representation.

UNIT-II **12 Hours**

Boolean algebra and Gate Networks – Boolean algebra, Evaluation of logical expressions, and standard forms, simplification of Boolean functions – map, tabulation method Logic Design, Digital Logic Gates, Wired OR and Wired AND Gates**.** Combinational logic – NAND, NOR circuits, Adders, Decoders, Multiplexers, ROM, PLA's and PALS

UNIT-III **12 Hours**

Sequential logic - Flip Flops, shift registers, counters, state diagram & state tables, Design of sequential circuits, Programmable Array of Logic cells. Arithmetic-logic unit – Half adder, Full adder, BCD adder, Magnitude Comparator, Multipliers, operation – study of typical ALU unit.

UNIT-IV **12 Hours**

Memory Element – RAMS – static, dynamic, ROMS, flexible disk storage system, magnetic disk memories and optical memories, Magnetic Tape, Tape Cassettes & Cartridges, and Digital Recording Techniques. Input-Output devices – Keyboards, Terminals, Printers, Alphanumeric codes, Cathode Ray tube Output Devices, Error detecting and correcting codes.

REFERENCE BOOKS

1. Thomas C. Bartee, "**Digital Computer Fundamentals**", Mc-Graw Hill, 1985, 6th edition.
2. Morris Mono M., "**Digital Logic and Computer Design**", PHI.
3. Morris Mano M, KimeR. Charles, "**Logic And Computer Design Fundumentals**", 2015, 5th edition

MCAH103 : MICROPROCESSORS AND PERIPHERALS

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

12 Hours

UNIT-I

Microcomputer Structure

Overview of microcomputer structure and operation, microprocessor evolution andtypes.Microprocessor and 8086 Architecture: 8086 internal architecture, introduction to 8086 programming, 8086Instruction Set: 8086 instruction description and assemblerdirectives

UNIT-II **12 Hours**

Programming the Microprocessor

8086 family assembly language programming – instruction templates, MOV instruction codingformat and examples, writing programs for use with an assembler, assembly language programdevelopment tools

Implementing Standard Program Structures in 8086 Assembly Language – simple sequenceprograms, jumps, flags, and conditional jumps, if-then, if-then-else, and multiple if-then-elseprograms, while-do programs, repeat-until programs, instruction timing and delay loops

UNIT-III **12 Hours**

Strings, Procedures and Macros

String instructions in 8086, writing and using procedures, writing and using assembler macros.

Arithmetic Co-processor

Data formats for arithmetic co-processor, 80x87 architecture and instruction set.

12 Hours

UNIT-IV

Interrupt Service Routine

8086 interrupts and interrupt responses, hardware interrupt applications, 8259A priorityinterrupt controller, software interrupt applications

Introduction To Advanced Microprocessors

Salient features of 80186,80286,80386,80486 and Pentium family processors.

Digital Interfacing

Programmable Parallel Ports and handshake I/O, methods of data transfer, implementing handshake data transfer.

REFERENCE BOOKS

1. Douglas V. Hall,**Microprocessors and Interfacing**,Revised 2nd Edition
2. Barry B. Brey, **Advanced Microprocessors**, 4th Edition
3. Liu and Gibson, **Microprocessors**, 2nd Edition
4. Barry B. Brey, **The Intel Microprocessors**, Prentice Hall, 2008, 8th Edition

MCAH104: OBJECT ORIENTED PROGRAMMING USINGC++

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I **12 Hours**

Language Basics: Object – oriented programming. Encapsulation. Polymorphism, Inheritance. The C++ Program – Pre-processor directives, A word about comments, a first look at input/output, C++ data types – pointer types, string types, const qualifier, reference types, bool type, enumeration types, array types, complex number types, typedef names, volatile qualifier, The new and delete expressions, Type conversions.

UNIT-II **12 Hours**

Procedural Programming: Functions – overview, function prototype, argument passing, Returning a value, recursion, inline functions, linkage directives, main(): handling command line options, pointers to functions, Scope and lifetime – scope, global objects and functions, local objects, dynamically allocated objects. Overload function – overloaded function declarations, the three steps of overload resolution, argument type conversions.

UNIT-III **12 Hours**

Class and Objects: Introduction, constructors and destructors, structures and classes, unions and classes – anonymous unions, friend functions, friend classes, inline functions. Parameterized constructors, static class members – Static data members, Static member function, Execution of constructors and destructors, scope resolution operator, nested classes, local classes, passing objects to functions, returning objects, object assignment.Arrays of objects – initialization v/s un initialization, Pointers to objects, Type checking pointers, this pointer, Pointers to derived types, pointers to class members. Creating a member operator function – overloading shorthand operators, operator overloading, and restriction. Operator overloading using a friend function – Using a friend to overload ++ or --, overloading some special operator: [], ->, comma operator.

UNIT-IV **12 Hours**

Core Concepts: Inheritance – Base class access control, Inheritance and protected members – protected base class inheritance. Inheriting multiple base classes, Constructors, Destructors and Inheritance – Execution of constructors and destructors, passing parameters to base class constructors, granting access, virtual base classes.

Virtual Function – Calling a virtual function through a base class reference, The virtual attribute is inherited, virtual functions are hierarchical, pure virtual function – abstract classes, using virtual function, early and late binding, Templates, Exception handling, File Handling.

REFERENCE BOOKS

1. Stanley B. Lippman and JoseeLajore, **C++ Primer,**Addision Wesley, 3rd Edition
2. RobortLafore, **Object- Oriented Programming in Turbo C++**, Galgotia Publisher.
3. Herbert Schildt, **C++, The Complete Reference,** TMH, 3rd Edition
4. BjarneStroustrup, The C++ Programming Language, Pearson Education, 3rd Edition.
5. E. Balagurusamy, Object oriented Programming using C++, Tata MacGraw Hill Publishers

MCAS 105 : WEB PROGRAMMING

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I **12 Hours**

Introduction: Web Publishing, Web Browsers, Web Servers, URL; Essential Web Developer Tools; Web hosting. **HTML5 and CSS3:** Introduction, Basics – Structure, Essential Tags, Lists, Links; Formatting Text with HTML and CSS, Including Style Sheets in a Page, Varieties of Selectors, Units of Measure, Box Model, Using Images on Web Pages, Image Formats, Using Images – Basics, Text Alignments, Links, Scale, Backgrounds, Bullets; Image-map, Image Etiquettes. Tables, Creating Table, Parts of Table; Formatting Tables – Size, Borders, Cells; Alignment and Spacing; Spanning; Advanced Enhancements.

UNIT-II **12 Hours**

Using CSS to Position Elements: Positioning Schemes, Absolute Positioning, Fixed Positioning, Controlling Stacking, Creating Drop-Down Menus. **Designing HTML5 Forms:** Basics; Creating Controls, Buttons and Fields; Grouping Controls; Displaying Updates; Applying Styles. **Structuring a Page with HTML5:** History, Laying Out a Page, Structural Tags, Page Outline, Structural Elements. **Advanced CSS Page Layouts:** Laying Out Page, The Role of CSS in Web Design.

UNIT-III **12 Hours**

JavaScript and jQuery: JavaScript – Significance, Basics, Environment, Events, Validating Forms, Hiding and Showing Content, Adding New Content to a Page. **Using jQuery:** Introduction, JavaScript Libraries, Selecting Elements from the Document, Binding Events, Modifying Styles on the Page, Modifying Content on the Page, Special Effects, AJAX and jQuery.

UNIT-IV **12 Hours**

PHP: Introduction, Basics, Loops, Built-In Functions, User-Defined Functions, Processing Forms, Using PHP Includes, Database Connectivity, Regular Expressions, Sending Mail, Object-Oriented PHP, Cookies and Sessions, File Uploads.

REFERENCE BOOKS:

1. Laura Lemay et.al., **Sams Teach Yourself HTML, CSS & JavaScript Web Publishing in One Hour a Day**, Pearson Education, 2016, 7th Edition.
2. Jon Duckett, **Web Design with HTML, CSS, JavaScript and jQuery** (set), Wiley, 2014
3. Robert W. Sebesta, **Programming the World Wide Web**, Pearson Education

MCAP106: OOP LAB

MCAP107: WEB PROGRAMMING LAB

MCAH201 : ADVANCED OPERATING SYSTEM

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I **12 Hours**

Operating System Overview : Operating System Objectives and Functions, The Evolution of Operating Systems, Major Achievements,Developments Leading to Modern Operating Systems,Microsoft Windows Overview, Traditional UNIX Systems,Modern UNIX Systems, Linux. **Process description & control :** What is aProcess?,ProcessStates,ProcessDescription,ProcessControl,Execution of the Operating System, Security Issues, UNIX SVR4 Process Management.

UNIT-II **12 Hours**

Threads, SMP, and Microkernel: Processes and Threads, Symmetric Multiprocessing (SMP), Microkernels, Windows Vista Thread and SMPManagement, Solaris Thread and SMP Management, Linux Process and Thread Management..**Virtual Memory :** HardwareandControlStructures, Operating System Software,UNIX and Solaris Memory Management, Linux Memory Management,Windows Vista Memory Management, Summary.

UNIT-III **12 Hours**

Multiprocessor and Real-Time Scheduling: Multiprocessor Scheduling, Real-Time Scheduling, Linux Scheduling, UNIX PreclsSl) Scheduling, Windows VistaScheduling.

Distributed Process Management: ProcessMigration, DistributedGlobal States, Distributed MutualExclusion,DistributedDeadlock. **Security:** Security Threats, Attacks, and Assets, Intruders, Malicious Software Overview, Viruses, Worms, and Bots, Rootkits.

UNIT-IV **12 Hours**

Kernel Organization: Using Kernel Services, Daemons, Starting the Kernel, Control in the Machine, Modules and Device Management, Module Organization, Module Installation and Removal, Process and Resource Management, Running Process Manager, Creating a new Task, IPC and Synchronization, The Scheduler, Memory Manager, The Virtual Address Space, The Page Fault Handler, File Management. **The windows NT/2000/XP kernel:** Introduction, The NT kernel, Objects, Threads, Multiplication Synchronization,Traps, Interrupts and Exceptions, The NT executive , Object Manager, Process and Thread Manager, Virtual Memory Manager, I/o Manager, The cache Manager , Kernel local procedure calls and IPC, The native API, subsystems.

REFERENCE BOOKS

1. William Stallings: **Operating Systems: Internals and Design Principles**, Prentice Hall, 2013, 6th Edition.
2. Gary Nutt: **Operating Systems**, Pearson, 2014, 3rd Edition.
3. Silberschatz, Galvin, Gagne: **Operating System Concepts**, Wiley, 2008, 8th Edition.
4. Andrew S. Tanenbaum, Albert S. Woodhull: **Operating Systems, Design and Implementation**, Prentice Hall, 2006, 3rd Edition.
5. Pradeep K Sinha: **Distributed Operating Systems, Concept and Design**, PHI, 2007.

MCAH202 : SYSTEM SOFTWARE

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I **12 Hours**

Introduction

System software and machine architecture The Simplified Instructional Computer (SIC) – Machinearchitecture - Data and instruction formats - addressing modes - instruction sets - I/O and programming.

Assemblers

Basic assembler functions - A simple SIC assembler – Assembler algorithm and data structures Machine dependent assembler features Instruction formats and addressing modes - Program relocation- Machine independent assembler features - Literals Symbol defining statements - Expressions – Onepass assemblers and Multi pass assemblers - Implementation example - MASM assembler.

UNIT-II **12 Hours**

Loaders and linkers

Basic loader functions - Design of an Absolute Loader – A Simple Bootstrap Loader -Machine dependentloader features - Relocation – Program Linking –Algorithm and Data Structures for Linking Loader -Machine-independent loader features -Automatic Library Search – Loader Options - Loader designoptions - Linkage Editors –Dynamic Linking – Bootstrap Loaders - Implementation example - MSDOS linker.

UNIT-III **12 Hours**

Macro processors Basic macro processor functions - Macro Definition and Expansion Macro Processor Algorithm and datastructures, Machine independent macro processor features - Concatenation of Macro Parameters Generation of Unique Labels Conditional Macro Expansion – Keyword Macro Parameters-Macro within Macro-Implementation example - MASM Macro Processor – ANSI C Macro language.

UNIT-IV **12 Hours**

System software tools

Text editors - Overview of the Editing Process - User Interface – Editor Structure. -Interactive debuggingsystems - Debugging functions and capabilities –Relationship with other parts of the system – User-Interface Criteria.

REFERENCE BOOKS

1. Leland L. Beck, "**System Software –An Introduction to Systems Programming**", 3rd
2. Edition, Pearson Education Asia, 2000
3. D. M. Dhamdhere, "**Systems Programming and Operating Systems**", Second
4. Revised Edition, Tata McGraw-Hill, 1999.
5. John J. Donovan "**Systems Programming**", Tata McGraw-Hill Edition, 1972.
6. John R. Levine, **Linkers & Loaders**, Harcourt India Pvt. Ltd., Morgan Kaufmann Publishers, 2000.

MCAH 203 : DATA COMMUNICATIONS AND COMPUTER NETWORKS

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I **12 Hours**

Introduction:Datacommunicationsfundamentals,Communication model,computer communicationsarchitecture,Data Communicationtasks,Data CommunicationSystems Applications,DataCommunicationSystemCharacteristicsfeatures, DataCommunication Networkcriteria, Protocolsandstandards, StandardsOrganizations,Line Configuration, Topology,Transmissionmode,Categoriesof Networks.Signals:Analog /Digitaldataand Signals,PeriodicandAperiodicSignals,TimeandFrequency Domains,CompositeSignals. Transmissionrate,Bitrate, Baudrateandsignallevels,Channelcapacity usingNyquistand Shannon's relation.

UNIT-II **12 Hours**

EncodingandModulating:DigitaltoDigitalConversion,AnalogtoDigital Conversion, Analog toAnalog Conversion,DigitaltoAnalogConversion,ModulationandDemodulation: Datamodulationmethods:ASK,FSK,PSK,QAM,PCM,PAM,POLAR,BIPOLAR,NRZ, RZ.TransmissionofDigitaldata :Interfacesand Modems:DigitalData transmission,DTE- DCE interface,OtherInterface Standards, Modem features ,TypesofModem andfunctions of MODEM.Transmissionmedia,Guidedmedia,Unguidedmedia,Transmissionimpairments and Performance.MultiplexingTechniques.

UNIT-III **12 Hours**

Definitionof ComputerNetworks,GoalsandApplications.ISO-OSIArchitecture,Functions and Servicesof Physical,Data link,Network,Transport, Session, PresentationandApplication Layers.Classificationsof Computer Networks:LocalArea Network(LAN), Wide Area Network WAN,MetropolitanArea Network, Storage Area Network(SAN), Public and Private Networks,Value AddedNetwork(VAN),Internetworks,TCP/IPreference Model,Novell NetwareReferenceModel. Standards ofNetworks. Distributed Applications

UNIT-IV **12 Hours**

PhysicalLayer Services,DataLinkLayer ServicesandNetworkLayer Services:Point–to – PointProtocol(PPP),Networking andInternetworkingTechnologyDevices,Repeaters, Bridges,Routers,Gateways,TCP/IPProtocolSuit:Overview ofTCP/IP,ClassesofIP, Addressing, AddressResolution Protocol (ARP), Reverse Address Resolution Protocol (RARP),InternetControlMESSAGEProtocol (ICMP),Internet GroupMessage Protocol (IGMP).Upper OSI Layers:TransportLayer,SessionLayer, PresentationandApplication Layer services. BOOTP, Dynamic Host Configuration Protocol(DHCP), Domain Name System(DNS),Telnet,Fle transfer Protocol(FTP),TrivialFileTransfer Protocol (TFTP),Simple MailTransfer Protocol(SMTP), PostOffice Protocol(POP), Simple Network ManagementProtocol(SNMP),HyperTextTransferProtocol(HTTP), World Wide Web (WWW).

REFERENCE BOOKS

1. WilliamStallings– Data&ComputerCommunications, PHI, 6th ed.
2. BehrouzAForouzan-DataCommunication&Networking,McGrawHill, 2000, 2nd edition
3. W. Tomasi– AdvancedElectronicCommunication Systems.
4. Forouzan, B.A., "TCP/IPProtocol", TMH
5. LauraChappell (ed),"Introduction to Cisco RouterConfiguration", Techmedia, 1999.
6. Tananbaum A.S., "ComputerNetworks", 3rd Ed, PHI, 1999.
7. Black U.,"ComputerNetworks-Protocols, Standards andInterfaces", PHI,1996.
8. Stallings W., "SNMP, SNMPv2, SNMPv3, RMON 1&2", 3rd Ed., Addison Wesley.

MCAH204 : ADVANCED DATA STRUCTURES

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I **12 Hours**

Introduction: Algorithms, performance analysis-time complexity and space complexity, Pseudo-Code, Quick Mathematical Review, O-notation, Omega notation and Theta notation. Stacks, Queues, Linked Lists, Double-Ended Queues. Trees: The Tree Abstract Data Type, Basic Algorithms on Trees, Binary Trees ,Data Structures for Representing Trees, Priority Queues Abstract Data Type , Heaps

UNIT-II **12 Hours**

Search Trees: Binary Search Trees, definition, ADT, implementation, operations-searching, insertion and deletion, Balanced search trees- AVL trees, definition, height of an AVL tree, representation, operations-insertion, deletion and searching. Introduction to Red – Black trees and Splay Trees, B-Trees, insertion, deletion and searching, Comparison of Search Trees.

UNIT-III **12 Hours**

Introduction to Set, Implementation, Basic Operations on Set ,Graphs, Directed Graphs ,Shortest Path Problem ,Undirected Graph ,Spanning Trees ,Graph Traversals, hash table representation, hash functions, collision resolution, separate chaining, open addressing, linear probing, quadratic probing double hashing, rehashing.

UNIT-IV **12 Hours**

Searching Techniques, Sorting, Internal Sorting, Bubble Sort, Insertion Sort, Quick, Sort, Heap Sort, Bin Sort, Radix Sort, External Sorting, Merge Sort, Multiway Merge Sort, Polyphase Sorting, Design Techniques: Divide and Conquer, Dynamic Programming, Greedy Algorithm, Backtracking, Local Search Algorithms

REFERENCE BOOKS

1. Mark A. Weiss, “Data structures and Algorithm analysis in C++(Java)”, Fourth Edition, PHI ,2013
2. Michael T.Goodrich, R.Tamassia and D.Mount “Data structures and Algorithms in C++”, Wiley student edition, John Wiley and Sons.
3. Data Structures and Algorithms in C++, Second Edition, Adam Drozdek, Vikas Publishing House, Thomson International Student Edition.
4. Ellis Horowitz, SartajSahni and SanguthevarRajasekaran, “Computer Algorithms/ C++”, Second Edition, Universities Press, 2007.
5. Michael T. Goodrich and Roberto Tamassia, “Data Structure and Algorithms in Java”, 3rd edition, ISBN: 0-471-46983-1.

MCAS205: JAVA PROGRAMMING

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I **12 Hours**

Introduction: Java and Java Applications, Features, Bytecode and Interpretation, JDK, JVM; Object-Oriented Programming, Simple Programs; Data Types, Variables, Arrays and Type Conversions; Operators and Expressions; Control Statements: Selection Statements, Iteration Statements and Jump Statements. **Classes and Objects:** Classes in Java, Declaring a Class, Creating Instances of Class, Members of a Class, Method Overloading; Different Types of Constructors, Inner Class; Uses of this Keyword; Garbage Collection; Recursion; Access Control; Static Members.

UNIT-II **12 Hours**

Inheritance: Introduction; Method Overriding and Dynamic Method Dispatch; Uses of super and final Keywords; Command Line Arguments; Varargs; Enumerations; **Exception Handling:** Exception Handling in Java. **Packages and Interfaces:** Packages, Importing Packages; Interfaces. **I/O:** Basics, Console I/O, Reading and Writing Files; **Generics**: Overview, Examples, Multiple Generic Parameters, Bounds, Wildcards, Generic Methods, Interfaces and Classes. **Collections:** Overview, Interfaces, Classes - ArrayList, LinkedList, HashSet and Map.

UNIT-III **12 Hours**

Multi-threaded Programming: Introduction; Creating Threads: Extending Threads; Implementing Runnable; Synchronization, Priorities, Inter-Thread Communication, Thread States and Methods on Thread Objects. **Event Handling:** Two Event Handling Mechanisms; The Delegation Event Model; Event Classes; Sources of Events; Event Listener Interfaces; Using the Delegation Event Model; Adapter Classes; Inner Classes.

UNIT-IV **12 Hours**

Lambda Expressions: Introduction, Block Lambda Expressions, Generic Functional Interfaces, Passing Lambda Expressions as Arguments, Exceptions, Variable Capture, Method References, Constructor References, Predefined Functional Interfaces. **Swing:** The Origins of Swing; Two Key Swing Features; Components and Containers; The Swing Packages; A Simple Swing Application; JLabel; ImageIcon; JTextField; The Swing Buttons; Understanding Layout Managers; JTabbedPane; JScrollPane; JList; JComboBox; JTable; Overview of Menu.

REFERENCE BOOKS:

1. Herbert Schildt, **Java - The Complete Reference** – McGraw Hill Education, 2014, 9th Edition.
2. Kathy Sierra and Bert Bates,**Head First Java**, O'Reilly, 2005, 2nd Edition.
3. Joshua Bloch, **Effective Java**, Addison Wesley, 2008, 2nd Edition.

MCAP 206: ADVANCED DATA STRUCTURES LAB

MCAP 207: JAVA PROGRAMMING LAB

MCAH 301 : ADVANCED DATABASE MANAGEMENT SYSTEMS

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I **12 Hours**

Review on Fundamentals of Databases: Concepts, Architecture, ER Modelling, Relational Databases, Fundamental and extended operations in Relational Database Model, SQL, basic and Complex queries in SQL. **Database Normalization and Security**: Normalization of Database Tables, Transaction and concurrency control, Database security, Authorization and Encryption.

UNIT-II **12 Hours**

Object Relational Database Systems: Objects, Object Identity, and Reference Types, Inheritance, Features of Object-relational Systems, Database Design for an ORDBMS, New Challenges in Implementing an ORDBMS, OODBMS, Comparing RDBMS with OODBMS and ORDBMS.
Emerging Database Technologies: Active Database Concepts and Triggers, Temporal Database, Multimedia Databases, Spatial Databases, Geographic Information Systems(GIS) and Deductive Databases.

UNIT-III **12 Hours**

Distributed Databases: Introduction to Distributed DBMS, Client-Server Model, Data Fragmentation, Replication, and Allocation Techniques for Distributed Database Design. Types of distributed databasesystems: - Federated databasesystems, Multi-database systems; Query processing in distributed databases. **XML and Internet Databases:** Structured, unstructured and semi structured data, XML Hierarchical data model, XML document, DTD and XML Schema XML documents and databases, and XML query.

UNIT-IV **12 Hours**

Data Warehousing: Characteristics of data warehouses, Data warehousing Components – Building a Data warehouse, Typical functionality of a data warehouse: Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata.

REFERENCE BOOKS

1. Raghu Ramakrishnan and JhonnesGehrke: Database Management Systems, McGrawHill 2000, Second Edition.
2. Elmasri and Navathe: Fundamentals of Database Systems, Addison-Wesley, 1999, Sixth Edition.

MCAH 302 : OBJECT-ORIENTED DATA MODELLING USING UML

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I **12 Hours**

The object Model, the evolution of object model, elements of object model, applying the object model, Classes and Objects, Relationships among objects, the nature of a class, relationship among classes, the interplay of classes and objects, on building quality classes and objects (selected topics from Grady Booch)

UNIT-II **12 Hours**

Advanced object Modelling, Aggregation, Abstract Classes, Generalization as extension and Restriction, Multiple inheritance, Metadata, Candidate Keys, Constraints. Dynamic Modelling – events and states, operations nested state diagrams, Concurrency, Functional Modelling, Data Flow Diagrams, specifying operations, Constraints, Relation of Functional to object and Dynamic Models.

UNIT-III **12 Hours**

Design Methodology, OMT as a software engineering methodology, Analysis, overview of analysis, Problem statement, overview of system Design, Breaking a system into subsystems, identifying Concurrency, Allocating subsystems to processes and tasks, Management of data stores, Handling global resources, choosing software control implementation, Handling Boundary condition, setting trade off priorities, Common architectural frameworks.

UNIT-IV **12 Hours**

Object Design, Overview of object design, Combining the three models, Design algorithms, Design optimization, implementation of Control adjustment of inheritance, Design of Association, object representation, Physical packaging. Implementation, from Design to implementation object-oriented style, Reusability, extensibility, Robustness, Object Oriented languages, translating a Design into an implementation.

REFERENCE BOOKS

1. James Rumbaugh et.al, Object-Oriented Modelling and Design, PHI, 1991.
2. Grady Booch et.al, Object-Oriented Analysis and Design with Applications, 2007, Wesley, 3rd Edition

MCAH 303 : COMPUTER GRAPHICS AND MULTIMEDIA

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I **12 Hours**

An Introduction Graphics System: Computer Graphics and Its Types, Application of computer graphics, Graphics Systems: Video Display Devices, Raster Scan Systems, Random Scan Systems, Graphics Monitors and Work Stations, Input Devices, Hard Copy Devices, Graphics Software.

UNIT-II **12 Hours**

Output Primitives and Attributes of Output Primitives: Output Primitives Points and Lines, Line Drawing Algorithms, Circle Generating Algorithms, Scan-Line Polygon Fill Algorithm, Inside-Outside tests, Boundary-Fill Algorithm, Flood Fill Algorithm, Cell Array, Character Generation, Attributes of Output Primitives: Line attributes, Color and Grayscale Levels, Area fill Attributes, Character Attributes, Bundled Attributes. Anti-aliasing.

UNIT-III **12 Hours**

Two-dimensional Geometric Transformations: Basic Transformations, Matrix Representations and Homogeneous Coordinates, Composite Transformations, Reflection and Shearing **Two-Dimension Viewing:** The viewing Pipeline, Window to view port coordinate transformation, Clipping Operations, Point Clipping, Line Clipping, Polygon Clipping, Text Clipping, Exterior Clipping Three–Dimensional Concepts: Three Dimensional Display Methods, 3D Transformations, Parallel Projection and Perspective Projection.

UNIT-IV **12 Hours**

Multimedia: Introduction to Multimedia: Classification of Multimedia, Multimedia Software, Components of Multimedia – Audio: Analog to Digital conversion, Sound card fundamentals, Audio play backing and recording Video, Text: Hyper text, Hyper media and Hyper Graphics, Graphics and Animation: Classification of Animation. Authoring Process and Tools. **Case Study:** graphics software MatLab, Use of MatLab in graphics application, Features of MatLab, Generalize application by using MatLab.

REFERENCE BOOKS

1. Donald Hearn and M.Pauline Baker, Computer Graphics, PHI
2.Roy A. Plastock, Theory & Problem of Computer Graphics, Tata McGraw Hill.
3. J D Foley and Van Dam, Fundamentals of Interactive Computer Graphics, Addison-Wesley.
4. Newman, Principles of Interactive Computer Graphics, McGraw Hill.
5. Tosijasu, L.K., Computer Graphics, Springer.
6. S Gokul, Multimedia Magic, BPB Publication.
7. Bufford, Multimedia Systems, Addison Wesley.
8. Jeffcoate, Multimedia in Practice, Pretice-Hall.

MCAH 304 : .NET TECHNOLOGY

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I 12 Hours

The philosophy of .NET: Introducing the Building Blocks of the .NET Platform (the CLR, CTS, and CLS), The Role of the Base Class Libraries and Managed vs. Unmanaged Code. An overview of .NET Assemblies. Understanding the CTS, CLS, CLR.

Building C# applications: Building C# Applications Using csc.exe, Building .NET Applications Using Visual Studio.

C# Language Fundamentals: C# programming constructs, System Data Types and Corresponding C# Keywords, The System. Console Class, Data Type Conversions, Operators and Expressions, Working with String Data, C# Iteration Constructs, Decision Constructs and the Relational/Equality Operators, Methods and Parameter Modifiers, Understanding C# Arrays, Understanding the enum Type, Understanding the Structure Type, Understanding Value Types and Reference Types, Understanding C# Nullable Types.

Object-Oriented Programming with C#: Encapsulation, Defining the Pillars of OOP,C# Access modifiers, Properties, Inheritance and Polymorphism.

UNIT-II 12 Hours

Understanding Structured Exception Handling: The Role of .NET Exception Handling, System level Exceptions, Application level Exceptions.

Working with Interfaces: Defnition, Implementation, Advanced keywords in C#, Interface as parameters, IEnumerable,IEnumerator, IConvertible Interfaces.

Delegates, Events, and Lambda Expressions: Definition,Multicast Delegate,Generic Delegates,Event Keyword,C# Anonymous methods,Lambda Expressions.

Advanced C# Language Features: Indexer Methods,Operator Overloading,CustomType Conversions,Pointer Types, Extension Methods.

LINQ to Objects:LINQ-Specific Programming Constructs,Role of LINQ, Applying LINQ Queries to Primitive Arrays, Returning the Result of a LINQ Query.

UNIT-III 12 Hours

Understanding .Net Assembles: An Overview of .NET Assembly, Building and Configuring Class Libraries, The Role of .NET Assemblies, Building the Multi-file Assembly, Using Assembly, Understanding Private Assemblies, Probing for Private Assemblies (The Basics), Understanding Shared Assembly, Understanding Shared Names, Building a Shared Assembly, Understanding Delay Signing, Installing/Removing Shared Assembly.

Dynamic Types and the Dynamic Language Runtime: The Role of the C# dynamic Keyword, The Role of the Dynamic Language Runtime (DLR).

ADO.NET Part I: The Connected Layer: Definition,ADO.NET Data Providers,ADO.NET Namespaces, Understanding the Connected Layer of ADO.NET, Building a Reusable Data Access Library, Understanding Database Transactions.

UNIT-IV **12 Hours**

ADO.NET Part II: The Disconnected Layer: Understanding the Disconnected Layer of ADO.NET, Understanding the Role of the Dataset, The Windows Forms Database Designer Tools.

ASP.NET Web Forms: Introduction, Role of HTTP, Understanding Web Applications and Web Servers, HTML, Client-Side Scripting, Overview of the ASP.NET API, Building an ASP.NET Web Page Using Code Files, ASP.NET Web Sites vs. ASP.NET Web Applications.

ASP.NET Web Controls, Master Pages, and Themes: Nature of Web Controls, Control and Web Control Base Classes, Categories of ASP.NET Web Controls, Role of the Validation Controls, Role of the Validation Controls.

REFERENCE BOOKS:

1. Andrew Troelsen, Sixth Edition,**,Pro C# 5.0 and the .NET 4.5 Framework**Apress, India, 2012, 6th Edition.
2. E. Balagurusamy, **Programming in C#,**Tata McGraw Hill. (For Programming Examples)
3. Tom Archer,**Inside C#**, WP Publishers, 2001.
4. Herbert Schildt, **C#: The Complete Reference** Tata McGraw Hill, 2004.

MCAS 305 : ADVANCED JAVA PROGRAMMING

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I **12 Hours**

Java 2 Enterprise Edition Overview: Overview of J2EE.

Java Database Connectivity (JDBC): The Concept of JDBC; JDBC Driver Types; JDBC Packages; A Brief Overview of the JDBC Process; Database Connection; Statement Objects; ResultSet; Transaction Processing; Metadata, Data Types; Exceptions.

UNIT-II **12 Hours**

Networking: Basics, Useful Classes and Interfaces, InetAddress, Sockets, URI, URL, URLConnection, HttpURLConnection, Datagrams.

Java Beans: Introduction, Advantages, Introspection, Bound and Constrained Properties, Persistence, Customizers, Java Beans API.

UNIT-III **12 Hours**

Servlets: Background, Life Cycle, Development Options, Tomcat, Example, Servlet API, Reading Parameters, javax.servlet.http Package, Handling HTTP Requests and Responses, Using Cookies, Session Tracking.

JavaServer Pages (JSP): JSP; JSP Tags; Tomcat; Request String; User Sessions; Cookies; Session Objects.

UNIT-IV **12 Hours**

Enterprise Java Beans: Enterprise Java Beans; Deployment Descriptors; Session Java Bean; Entity Java Bean; Message-Driven Bean; The JAR File.

Hibernate: Persistence, Problems in Object/Relational Mapping, Object/Relational Mapping and Java Persistence API; Introduction to Hibernate, Creating a JPA Project.

REFERENCE BOOKS:

1. Jim Keogh, **J2EE - The Complete Reference**, Tata McGraw Hill, 2008.
2. Herbert Schildt, **Java - The Complete Reference**, McGraw Hill Education, 2014, 9th Edition.
3. Gavin King et.al., **Java Persistence with Hibernate**, Manning Publications, 2016,2nd Edition.
4. Cameron McKenzie, **Hibernate Made Easy**, Pulpjava, 2008
5. Phil Hanna, **JSP 2.0: The Complete Reference**, Osborne

MCAP 306: . NET PROGRAMMING

MCAP307: DBMS LAB

MCAP308: Computer Graphics Lab

MCAP309: UML Modelling Lab

MCAH401 : SOFTWARE ENGINEERING

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

12 Hours

UNIT-I

Introduction: Professional Software Development, Software Engineering Ethics. Case Studies. **Software Processes**: Models. Process activities. Coping with Change. The Rational Unified Process.

UNIT-II **12 Hours**

Agile Software Development: Agile methods. Plan-driven and agile development. Extreme programming. Agile project management. Scaling agile methods. **Requirements Engineering**: Functional and non-functional requirements .The software Requirements Document. Requirements Specification. Requirements Engineering Processes. Requirements Elicitation and Analysis. Requirements validation. Requirements Management.

UNIT-III **12 Hours**

System Models: Context models. Interaction models. Structural models. Behavioural models. Model-driven engineering. **Design and Implementation**: Object-oriented design using the UML. Design patterns. Implementation issues. Open source Development.

UNIT-IV **12 Hours**

Software Testing: Development testing, Test-driven development, Release testing, User testing. **Software Evolution**: Evolution processes .Program evolution dynamics. Software maintenance. Legacy system management. **Project Planning**: Software pricing. Plan-driven development. Project scheduling. Agile planning. Estimation techniques. **Quality management:** Software quality. Software standards. Reviews and inspections. Software measurement and metrics.

REFERENCE BOOKS

1. **Ian Somerville**, Software Engineering, Pearson Education, 2012, 9th Edition.
2. **Roger.S.Pressman**, Software Engineering - A Practitioners approach, Tata McGraw Hill, 7th Edition.
3. **PankajJalote**: An Integrated Approach to Software Engineering, Wiley India.

MCAH402 : DISTRIBUTED COMPUTING

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I **12 Hours**

Principles of distributed computing: Fundamentals:-What is Distributed Computing Systems?, Distributed Computing System Models, What is DOS?, Issues in designing a DOS, Why gaining popularity in DOS?, Introduction to Distributed Computing Environment (DCE).
Distributed databases: Definition, Introduction, Features Of Distributed Versus Centralized Databases, Why Distributed Databases?, Distributed Database Management Systems (DDBMSs), Reference Architecture For Distributed Databases, Types Of Data Fragmentation, Distributed database design, Objectives of the design of data distribution, Top-down and Bottom-up approaches to the design of data distribution.

UNIT-II **12 Hours**

Distributed objects and remote invocation: Introduction, Communication between distributed objects, Remote procedure calls, Events and notifications.

Distributed Operating System Support: Introduction, The operating system layer, Processes and threads, Communication and invocation, operating system architecture. Security: Overview of security techniques, Cryptographic algorithms, Digital signatures.

UNIT-III **12 Hours**

Distributed File Systems: Introduction, File service architecture, Sun Network File System (NFS).Distributed Time and clocks: Introduction, Clocks, events and process states, Synchronizing physical clocks, Logical time and logical clocks.Coordination and Agreement: Distributed mutual exclusion algorithms, Election algorithms, and multicast communication.

UNIT-IV **12 Hours**

Transactions and Concurrency Control: Introduction, Transactions, Nested transactions, Locks, Optimistic concurrency control, Time stamp ordering. Distributed transactions:- Introduction, Flat and nested distributed transactions, Atomic commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery.

REFERENCE BOOKS

1. Pradeep K Sinha, Distributed Operating Systems - Concepts and design, PHI, 2009, 1st Edition.
2. Stefano Ceri, Giuseppe PelagattiDistributed Databases - Principles and systems, McGraw-Hill International editions.
3. Distributed Systems: Concepts and Design, George Coulouris, Jean Dollimore, Tim Kindberg, Gordon Blair PHI, 2012, 5th edition.

MCAH403 : ADVANCED WEB PROGRAMMING

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I 12 Hours

RESTful Web Services: Introduction, Architectural Principles; Designing RESTful Services - The Object Model, Model and URIs, Defining the Data Format, Assigning HTTP Methods.

JAX-RS: Developing a JAX-RS RESTful Service, Deploying, Writing a Client. **HTTP Method and URI Matching:** Binding HTTP Methods, @Path, Sub-resource Locators, Gotchas in Request Matching; **JAX-RS Injection:** Basics, Injecting Different Types of Parameters, Common Functionality.

UNIT-II 12 Hours

JAX-RS Content Handlers: Built-in Content Marshalling, JAXB, Custom Marshalling. **Server Responses and Exception Handling:** Default Response Codes, Complex Responses, Exception Handling. **JAX-RS Client API:** Introduction, ClientBuilder, Client and WebTarget, Building and Invoking Requests. Configuration Scopes.

UNIT-III 12 Hours

Node.js: JavaScript and Node.js – Introduction, Server-Side JavaScript, Hello Word application; Node.js Use Cases, Application Stack. Building the Application Stack: Basic HTTP Server and Analysis, Passing Functions Around, Server Working, Event-Driven Asynchronous Callbacks, Handling Requests, Placing Server Module, Route Requests – Basics and Real Handlers, Execution, Responding, Serving, Handling POST Request, Handling File Uploads.

UNIT-IV 12 Hours

Search Engines and SEO: What is SEO? Needs for SEO; SEO in Social Media; Doing SEO on Your Own; Finding Sites; Working of Search Engines – Google, Bing, Yahoo!, International Searches; SEO Techniques – Friendliness, Keywords and Keyword Research, Creating Content for Customers, Myths and Facts; Tools for Tracking and Managing SEO: Sitemaps, robots.txt, Canonical Links, Duplicate Content, Checking, Tracking, Paying for Links.

REFERENCE BOOKS:

1. Bill Burke**, RESTful Java with JAX-RS 2.0** – Designing and Developing Distributed Web Services, O'Reilly, 2013, 2nd Edition.
2. Manuel Kiessling**, The Node Beginner Book**, Leanpub, 2016
3. Laura Lemay et.al**, Sams Teach Yourself HTML, CSS & JavaScript Web Publishing in One Hour a Day**, Pearson Education, 2016, 7th Edition
4. Martin Kalin**. Java Web Services: Up and Running**, O'Reilly Media, 2013, 2nd Edition.
5. SandroPasquali**, Mastering Node.js**, Packt, 2013

MCAS404 : ADVANCED COMPUTER NETWORKS

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I **12 Hours**

Introduction: Introduction to Computer Networks. Understanding Network architecture. Introduction to TCP/IP Architecture, TCP/IP addressing, services, FTP, SMTP, TFTP, SNMP, and Network file system, domain name system, transport layer protocols, user datagram protocol, transmission control protocol, Class addresses, ARP, RARP.

UNIT-II **12 Hours**

Inter process communications: File and record locking, pipes, FIFO's, stream and messages, message queues, semaphores

UNIT-III **12 Hours**

Sockets: Sockets system calls, reserved ports, stream pipes, socket option, asynchronous I/O, Sockets and signals. Understanding the Internet Protocols SLIP versus PPP. Understanding the Socket interface. Concepts of the Windows sockets API. Importance of Raw Sockets. Internet Application Services, E-Mail, File Transfer Protocols, Characteristic Features of the Firewall.

UNIT-IV **12 Hours**

Transport Layer Interface: Elementary TLI functions, stream and stream pipes, asynchronous I/O multiplexing. **Remote Procedure calls:** Remote login, remote command execution, external data representation. UUCP.

REFERENCE BOOKS

1. A. Stevens, "TCP/IP Illustrated", Vol. 1-3, Addison Wesley, 1998.
2. R. Stevens, "Unix Network Programming", PHI, 1998
3. J. Martin, "TCP/IP Networking – Architecture, Administration and programming", Prentice Hall, 1994.
4. D.E. Comer, "Internetworking with TCP/IP, Vol. 1, Principles, Protocols, and architecture, PHI, 2000.
5. Internet Programming by Kris Jamsa, Galgotia publishers, 2001.

MCAS405 : IMAGE PROCESSING

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I **12 Hours**

Introduction:-Fundamental Steps in Digital Image Processing, Components of an Image Processing System, Image Sensing and Acquisition, Image Sampling and Quantization. **Image Enhancement in the Spatial Domain**: - Basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic/Logic Operations. Basics of Spatial Filtering: Smoothing Spatial Filters, Sharpening Spatial Filters.

UNIT-II **12 Hours**

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Image Transforms such as FT, DCT, and HAAR Transform etc. **Image Enhancement in the Frequency:-**Introduction to the Fourier Transform and the Frequency Domain, Smoothing Frequency- Domain Filters, Sharpening Frequency Domain Filters.

UNIT-III **12 Hours**

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Image Restoration: Model of the Image Degradation/Restoration Process, Noise Models, Restoration in the Presence of Noise Only Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear, Position-Invariant Degradations, Estimating the Degradation Function. **Image Compression**: Fundamentals, Image Compression Models, Error Free Compression, Lossy Compression. **Morphological Image Processing:** Preliminaries, Dilation and Erosion, Opening and Closing The Hit – or Miss Transformation, Some Basic Morphological Algorithms

UNIT-IV **12 Hours**

Image Segmentation: Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region-Based Segmentation, The Use of Motion in Segmentation. **Representation and Description:** Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Relational Descriptors..

REFERENCE BOOKS

1. R.C.GonzalezandR.E.Woods**, Digital Image Processing**, Prentice Hall.
2. B.Chanda,andD.DuttaMajumder**, Digital Image Processing and Analysis**,Prentice-HallPvt.Ltd, 2000

MCAS406 : SOFTWARE ARCHITECTURE

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I **12 Hours**

Introduction: The Architecture Business Cycle: Where do architectures come from? Software processes and the architecture business cycle; What makes a "good" architecture? What software architecture is and what it is not; Other points of view; Architectural patterns, Reference models and reference architectures; Importance of software architecture; Architectural structures and views. **Architectural Styles And Case Studies:** Architectural styles; Pipes and filters; Data abstraction and object-oriented organization; Event-based, implicit invocation; Layered systems; Repositories; Interpreters; Process control; Other familiar architectures; Heterogeneous Architectures. Case Studies: Keyword in Context; Instrumentation software; Mobile robotics.

UNIT-II **12 Hours**

Quality: Functionality and architecture; Architecture and quality attributes; System quality attributes; Quality attribute scenarios in practice; Other system quality attributes; Business qualities; Architecture qualities. Achieving Quality: Introducing tactics; Availability tactics; Modifiability tactics; Performance tactics; Security tactics; Testability tactics; Usability tactics.

UNIT-III **12 Hours**

Architectural Patterns: Introduction, Distributed Systems: Broker; Interactive Systems: MVC, Presentation-Abstraction-Control. Adaptable Systems: Microkernel; Reflection. **Some Design Patterns:** Structural decomposition: Whole – Part; Organization of work: Master – Slave; Access Control: Proxy.

UNIT-IV **12 Hours**

Designing And Documenting Software Architecture: Architecture in the life cycle; designing the architecture; Forming the team structure; Creating a skeletal system. Uses of architectural documentation; Views; choosing the relevant views; Documenting a view; Documentation across views.

REFERENCE BOOKS

1. Len Bass, Paul Clements, Rick Kazman**, Software Architecture in Practice,** Pearson Education, 2003, 2nd Edition.
2. Frank Buschmann, ReginеMeunier, Hans Rohnert, Peter Sommerlad, Michael Stal**, Pattern-Oriented Software Architecture, A System of Patterns -Volume 1,** John Wiley and Sons, 2006.
3. **Mary Shaw and David Garlan**, Software Architecture-Perspectives on an Emerging Discipline, Prentice-Hall of India, 2007.
4. E. Gamma, R. Helm, R. Johnson, J. Vlissides, **Design Patterns- Elements of Reusable Object-Oriented Software**, Addison- Wesley, 2003.

MCAS407 : MOBILE COMPUTING

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I **12 Hours**

Introduction: Mobile Computing – Mobile Computing Vs wireless Networking – Mobile Computing Applications – Characteristics of Mobile computing – Structure of Mobile Computing Application. MAC Protocols – Wireless MAC Issues – Fixed Assignment Schemes – Random Assignment Schemes – Reservation Based Schemes

UNIT-II **12 Hours**

Mobile Internet Protocol And Transport Layer: Overview of Mobile IP – Features of Mobile IP – Key Mechanism in Mobile IP – route Optimization. Overview of TCP/IP – Architecture of TCP/IP- Adaptation of TCP Window – Improvement in TCP Performance. Mobile Telecommunication System: Global System for Mobile Communication (GSM) – General Packet Radio Service (GPRS) – Universal Mobile Telecommunication System (UMTS).

UNIT-III **12 Hours**

Mobile Ad-Hoc Networks: Ad-Hoc Basic Concepts – Characteristics – Applications – Design Issues – Routing – Essential of Traditional Routing Protocols –Popular Routing Protocols – Vehicular Ad Hoc networks (VANET) – MANET vs VANET – Security.

UNIT-IV **12 Hours**

Mobile Platforms And Applications: Mobile Device Operating Systems – Special Constrains & Requirements – Commercial Mobile Operating Systems – Software Development Kit: iOS, Android, BlackBerry, Windows Phone – M Commerce – Structure – Pros & Cons – Mobile Payment System – Security Issues.

REFERENCE BOOKS

1. Prasant Kumar Pattnaik, Rajib Mall, “Fundamentals of Mobile Computing”, PHI Learning Pvt. Ltd, New Delhi – 2012.
2. Jochen H. Schller, “Mobile Communications”, Second Edition, Pearson Education, New Delhi, 2007.
3. Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd, 2005.
4. UweHansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Springer, 2003.
5. William.C.Y.Lee,“Mobile Cellular Telecommunications-Analog and Digital Systems”, Second Edition,TataMcGraw Hill Edition,2006.
6. C.K.Toh, “AdHoc Mobile Wireless Networks”, First Edition, Pearson Education, 2002.

MCAS408 : WIRELESS COMMUNICATION

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

12 Hours

UNIT-I

Wireless Channels : Large scale path loss – Path loss models: Free Space and Two-Ray models -Link Budget design – Small scale fading- Parameters of mobile multipath channels – Time dispersion parameters Coherence bandwidth – Doppler spread & Coherence time, Fading due to Multipath time delay spread – flat fading – frequency selective fading – Fading due to Doppler spread – fast fading – slow fading.

12 Hours

UNIT-II

Cellular Architecture : Multiple Access techniques - FDMA, TDMA, CDMA – Capacity calculations–Cellular concept Frequency reuse - channel assignment- hand off- interference & system capacity- trunking & grade of service – Coverage and capacity improvement.

12 Hours

UNIT-III

Digital Signalling For Fading Channels: Structure of a wireless communication link, Principles of Offset-QPSK, p/4-DQPSK, Minimum Shift Keying, Gaussian Minimum Shift Keying, Error performance in fading channels, OFDM principle – Cyclic prefix, Windowing, PAPR.

UNIT-IV **12 Hours**

Multipath Mitigation Techniques: Equalization – Adaptive equalization, Linear and Non-Linear equalization, Zero forcing and LMS Algorithms. Diversity – Micro and Macro diversity, Diversity combining techniques, Error probability in fading channels with diversity reception, Rake receiver. Multiple Antenna Techniques: MIMO systems – spatial multiplexing -System model -Pre-coding - Beam forming - transmitter diversity, receiver diversity- Channel state information-capacity in fading and non-fading channels

REFERENCE BOOKS

1. Rappaport,T.S., “Wireless communications”, Second Edition, Pearson Education, 2010.
2. Andreas.F. Molisch, “Wireless Communications”, John Wiley – India, 2006.
3. David Tse and PramodViswanath, “Fundamentals of Wireless Communication”, Cambridge University Press, 2005.
4. UpenaDalal, “ Wireless Communication”, Oxford University Press, 2009.
5. Van Nee, R. and Ramji Prasad, “OFDM for wireless multimedia communications”, Artech House, 2000.

MCAS409: SOFTWARE TESTING AND AUTOMATION

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I

12 Hours

Introduction to Testing – why and what, Why is testing necessary? What is testing? Role of Tester, Testing and Quality, Overview ofSTLCSoftware Testing Life Cycle - V model**,** SDLC vs. STLC, different stages in STLC, document templates generated in different phases ofSTLC, different levels of testing, different types of testing**,** Static Testing**,** Static techniques, reviews, walkthroughs.

UNIT-II

12 Hours

Basics of test design techniques**,** Various test categories, test design techniques for different categories of tests. Designing testcases using MS-Excel. Test management**,** Documenting test plan and test case, effort estimation, configuration management, projectprogress management. Use of Testopia for test case documentation and test management.

UNIT-III

12 Hours

Defect management**,** Test Execution, logging defects, defect lifecycle, fixing / closing defects. Use of Bugzilla forlogging and tracing defects.Test Data Management**,** Test Data Management –Overview, Why Test Data Management, Test Data Types, and Need forTest Data Setup, Test Data Setup Stages, and Test data management Challenges. Creating sampletest data using MS-ExcelBasics of Automation testing**,** Introduction to automation testing, why automation, what to automate, tools available for automation testing.

UNIT-IV

12 Hours

Basics of Automation testing using Selenium**,** Introduction to Selenium, using Selenium IDE for automation testing, using Selenium Webdriver for automation testing, understanding TestNG framework with Selenium Web driver forautomation testing

REFERENCE BOOKS

1. Rex Black, Managing the Testing Process, John Wiley, 2001, 2nd Edition
2. Dorothy Graham, Erik van Veenendaal, Isabel Evans, Foundations of Software Testing, Rex Black
3. Elfriede Dustin , Implementing Automated Software Testing - How to Save Time and Lower CostsWhile Raising Quality

MCAS410 : E-COMMERCE

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I **12 Hours**

IT and business, various applications of IT in business field**.** History of e-commerce, definition, classification- B2B, B2C, C2C, G2C, B2G sites, e-commerce in education, financial, auction, news, entertainment sectors, Doing ecommerce., EDI and its components

UNIT-II **12 Hours**

Electronic payment systems – credit cards, debit cards, smart cards, e-credit accounts, e-money, EFT, security concerns in e commerce, authenticity, privacy, S-HTP, Secure e-mail protocols, integrity, non-repudiation, encryption, secret key cryptography, public key cryptography, SET, SSL, digital signatures, firewalls.

UNIT-III **12 Hours**

Internet Marketing Phase, Marketing on the web, marketing strategies, creating web presence, advertising, customer service and support, web branding strategies, web selling models.

UNIT-IV **12 Hours**

M-commerce; case study of two internationally successful e-commerce web sites and two Kerala-based e-commerce web sites; IT act (India) and e-commerce.

REFERENCE BOOKS

1. C. S. V.Murthy, E-Commerce, Himalaya Publishing House.
2. NIIT, Basics of E-Commerce, PHI.
3. Erfan Turban et. al., Electronic Commerce–A Managerial Perspective, Pearson Education.
4. R Kalokota, Andrew V. Winston, Electronic Commerce – A Manager's Guide, Pearson Education.

MCAS411 : OPERATION RESEARCH

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I **12 Hours**

Introduction: Nature and developments of operations research, characteristics of operations research, necessity of operations research in industry, scope of OR in management, objectives of OR, models in OR, role of computers in OR, limitations of OR. Linear Programming: Requirements of linear programming problems, formulation of linear programming problem, graphical solution, simplex algorithm, computational procedure in simplex, duality and its concept, application of L.P. model to product mix and production scheduling problems, limitations of linear programming.

UNIT-II **12 Hours**

Transportation model: Definition of transportation model, formulation and solution methods, and degeneracy in transportation problems. Assignment Model: Definition of assignment model, comparison with transportation model, formulation and solution methods, the travelling salesman problem.

UNIT-III **12 Hours**

Queuing Models: Application of queuing models, characteristics of queuing models, single channel queuing theory, solution to single channel with poison arrivals and exponential service infinite population model, Industrial applications of queuing theory. Simulation: When to use simulation, Advantages and limitations of the simulation technique, generation of random numbers, Monte-Carlo simulation, And computer-aided simulation: applications in maintenance and inventory management.

UNIT-IV **12 Hours**

Game Theory and Network Analysis: PERT and CPM: Work breakdown structure, network logic, critical path, CPM Vs PERT, slack and floats. Game theory: Pure strategies and Mixed strategies. Application of software skill in Operations Research.

REFERENCE BOOKS

1. P.K. Gupta and D.S.Hira, S Chand, **Operations Research**, S Chand and company.
2. A.H. Taha, **Operation Research - An Introduction**, Macmillan Publishing Co.
3. W.D. Miller and M.K Starr , **Executive Decisions and Operations Research**, Prentice Hall
4. Hillier and Lieberman, **Introduction of Operations Research**.
5. Ackoff and Sasiene, **Fundamentals of Operations Research**.
6. Jerry Banks, David M. Nicole, Barry L. Nelson, **Discrete-event system simulation**

MCAP412: Distributed Computing Lab

MCAP413: Computer Network Lab

MCAP414: Image Processing Lab

MCAP415: Advanced Web Programming Lab

MCAP416: E-Commerce Lab

MCAP417: Operational Research Lab

MCAH501: DATA MINING TECHNIQUES

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

12 Hours

UNIT-I

Introduction: Motivations, Data Mining Databases-Relational Databases, Data warehouse, Transactional Databases, Advanced Database systems and advanced Database applications. Data Mining Functionalities-Concept/Class Discrimination; characterizations and Discrimination, Association Analysis, Classification and Prediction, Cluster Analysis, Outlier Analysis and Evolution Analysis. Classifications of Data Mining Systems, Major issues in Data Mining. **Data Pre-processing**: Data Cleaning, Data Integration and Transformation, Data Reduction, Discrimination and Concepts Hierarchy Generation.

Data Warehouse and OLAP technology for data Mining: Definition of data warehouse, A Multidimensional Data Model, Data warehouse architecture, Data warehouse implementation, Further development of data cubes technology, From data warehousing to data Mining.

UNIT-II **12 Hours**

Mining Primitives, Languages and Systems Architectures: Data Mining Primitives, Data Mining Query Languages, Designing Graphical User Interfaces Based onData Mining Query Languages and Architecture of Data Mining systems.

Concept Description: Characterization and Comparison: Concept Description, Data Generalization and Summarization-based Characterization, Analytical Characterization: Analysis of Attributes Relevance, Missing Class comparisons: Discriminating Between Different classes, Mining Descriptive Statistical Measures in Large Databases.

UNIT-III **12 Hours**

Mining Association Rules in Large Database: Association Rule Mining, Mining Single-Dimensional Association Rules From Transactional Databases, Mining Multi-Association Rules From Transaction Databases, Mining Multi-dimensional Association Rules from Relational Databases and Data Warehouses, From Association Mining Correlation Analysis, Constraint-Based Association Mining.

UNIT-IV **12 Hours**

Classification and Prediction: Definition of Classification, issues regarding classification and Prediction, Classification by decision tree induction, Bayesian Classification, Classification by Back propagation, Classification based on concepts from association rules mining, other classification methods, prediction, classification accuracy.**Cluster Analysis:** Definition of Cluster, Types of data in cluster analysis, A categorization of major cluster Methods, Partitioning methods, Hierarchical methods, Density-Base Methods, Grid-based methods, Model based Methods, Outlier analysis.

REFERENCE BOOKS

1. Jaiawei Han and MichelineKamber, Data Mining Concepts and Techniques,3rd Edition, Morgan Kaufmann/Elsevier Science publisher, Reprint published by Harcourt (INDIA) Private Limited.
2. David L. Olson,DursunDelen, Advanced Data Mining Techniques,Springer publishers.

MCAH502 : PYTHON PROGRAMMING

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I **12 Hours**

Introduction to python, the concept of data types; variables, assignments; immutable variables; numerical types; arithmetic operators and expressions; comments in the program; understanding error messages; Conditions, Boolean logic, logical operators; ranges; Control statements: if-else, loops (for, while); short circuit evaluation; Strings and text files; manipulating files and directories, os and sys modules; text files: reading/writing text and Numbers from/to a file; creating and reading a formatted file (csv or tab-separated).

UNIT-II **12 Hours**

String manipulations: subscript operator, indexing, slicing a string; strings and number System: converting strings to numbers and vice versa. Binary, octal, hexadecimal numbers Lists, tuples, and dictionaries; basic list operators, replacing, inserting, removing an element; searching and sorting lists; dictionary literals, adding and removing keys, accessing and Replacing values; traversing dictionaries.

UNIT-III **12 Hours**

Design with functions: hiding redundancy, complexity; arguments and return values; formal vs. actual arguments, named arguments. Program structure and design. Recursive functions. Classes and OOP: classes, objects, attributes and methods; defining classes; design with classes, data modelling; persistent storage of objects inheritance, polymorphism, operator overloading (_eq_,_str_, etc); abstract classes; exception handling, try block

UNIT-IV **12 Hours**

Python database application programmer's interface (DB- API), connection and cursor objects, Type objects and constructors, python database adapters. Creating simple web clients, introduction to CGI, CGI module, building CGI applications, python web application frameworks.

REFERENCE BOOKS

1. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning,
2. Magnus Lie Hetland, Beginning Python from Novice to Professional, Second Edition.
3. Mark Summerfield, Programming in Python 3 - A Complete Introduction to the Python Language, Second Edition.
4. Y. Daniel Liang, “Introduction to Programming Using Python”, Pearson
5. Chun, J Wesley, Core Python Programming, 2nd Edition, Pearson, 2007 Reprint 2010.
6. David Beazley and Brian K. Jones, Python Cookbook, Third Edition, Shroff Publishers & Distributors Pvt. Ltd.
7. Mark Lutz, Learning Python FIFTH EDITION Mark Lutz.
8. Mark Lutz, Programming Python (English) 4th Edition.
9. Testing Python, David Sale, Wiley India (P) Ltd.,

MCAH 503: ANDROID APPLICATION DEVELOPMENT

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I **12 Hours**

Introduction to Android Operating System: Android OS design and Features – Android development framework, SDK features, Installing and running applications on Eclipse platform, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools Android application components – Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes.

UNIT-II **12 Hours**

Android User Interface: Measurements – Device and pixel density independent measuring units Layouts – Linear, Relative, Grid and Table Layouts User Interface (UI) Components – Editable and non editable Text Views, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers Event Handling – Handling clicks or changes of various UI components Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities

UNIT-III **12 Hours**

Intents and Broadcasts: Intent – Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, Native Actions, using Intent to dial a number or to send SMS Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity Notifications – Creating and Displaying notifications, Displaying Toasts.

UNIT-IV **12 Hours**

Persistent Storage: Files – Using application specific folders and files, creating files, reading data from files, listing contents of a directory Shared Preferences – Creating shared preferences, saving and retrieving data using Shared Preference Database – Introduction to SQLLite database, creating and opening a database, creating tables, inserting retrieving and deleting data, Registering Content Providers, Using content Providers (insert, delete, retrieve and update). Advanced Topics: Alarms – Creating and using alarms Using Internet Resources – Connecting to internet resource, using download manager Location Based Services – Finding Current Location and showing location on the Map, updating location.

REFERENCE BOOKS

1. RetoMeier,,Professional Android 4 Application Development, Wiley India, (Wrox) , 2012.
2. James C Sheusi,,Android Application Development for Java Programmers, Cengage Learning, 2013
3. Wei-MengLee,,Beginning Android 4 Application Development, Wiley India (Wrox), 2013

MCAS504 : BIG DATA ANALYTICS

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I **12 Hours**

Introduction To Big Data: Introduction – distributed file system – Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce.

UNIT-II **12 Hours**

Introduction Hadoop: Big Data – Apache Hadoop&Hadoop Eco System – Moving Data in and out of Hadoop – Understanding inputs and outputs of Map Reduce - Data Serialization.
Hadoop Architecture: Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands , Anatomy of File Write and Read., Name Node, Secondary Name Node, and Data Node, Hadoop Map Reduce paradigm, Map and Reduce tasks, Job, Task trackers - Cluster Setup – SSH &Hadoop Configuration – HDFS Administering –Monitoring & Maintenance.

UNIT-III **12 Hours**

Hadoop Ecosystem And Yarn: Hadoop ecosystem components - Schedulers - Fair and Capacity, Hadoop 2.0 New Features Name Node High Availability, HDFS Federation, MRv2, YARN, Running MRv1 in YARN.

UNIT-IV **12 Hours**

Hive And Hiveql, Hbase : Introduction to No Query Language, Hive Architecture and Installation, Comparison with Traditional Database, HiveQL - Querying Data - Sorting And Aggregating, Map Reduce Scripts, Joins & Sub queries, HBase concepts Advanced Usage, Schema Design, Advance Indexing - PIG, Zookeeper - how it helps in monitoring a cluster, Hbase uses Zookeeper and how to Build Applications with Zookeeper.

REFERENCE BOOKS

1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Wiley, 2015.
2. Chris Eaton, Dirk deroos et al. , “Understanding Big data ”, McGraw Hill, 2012.
3. Tom White, “HADOOP: The definitive Guide” , O Reilly, 2012.
4. VigneshPrajapati, “Big Data Analytics with R and Haoop”, Packet Publishing 2013.
5. Tom Plunkett, Brian Macdonald et al, “Oracle Big Data Handbook”, Oracle Press, 2014.
6. JyLiebowitz, “Big Data and Business analytics”,CRC Press, 2013.

MCAS 505 : CLOUD AND GRID COMPUTING

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

12 Hours

UNIT-I

Introduction : Evolution of Distributed computing: Scalable computing over the Internet – Technologies for network based systems – clusters of cooperative computers - Grid computing Infrastructures – cloud computing - service oriented architecture – Introduction to Grid Architecture and standards – Elements of Grid – Overview of Grid Architecture. Grid Services: Introduction to Open Grid Services Architecture (OGSA) – Motivation – Functionality Requirements – Practical & Detailed view of OGSA/OGSI – Data intensive grid service models – OGSA services.

12 Hours

UNIT-II

Virtualization: Cloud deployment models: public, private, hybrid, community – Categories of cloud computing: Everything as a service: Infrastructure, platform, software - Pros and Cons of cloud computing – Implementation levels of virtualization – virtualization structure – virtualization of CPU, Memory and I/O devices – virtual clusters and Resource Management – Virtualization for data center automation.

12 Hours

UNIT-III

Programming Model 9 Open source grid middleware packages – Globus Toolkit (GT4) Architecture , Configuration – Usage of Globus – Main components and Programming model - Introduction to Hadoop Framework - Mapreduce, Input splitting, map and reduce functions, specifying input and output parameters, configuring and running a job – Design of Hadoop file system, HDFS concepts, command line and java interface, dataflow of File read & File write.

UNIT-IV **12 Hours**

Security 9 Trust models for Grid security environment – Authentication and Authorization methods – Grid security infrastructure – Cloud Infrastructure security: network, host and application level – aspects of data security, provider data and its security, Identity and access management architecture, IAM practices in the cloud, SaaS, PaaS, IaaS availability in the cloud, Key privacy issues in the cloud.

REFERENCE BOOKS

1. Kai Hwang, Geoffery C. Fox and Jack J. Dongarra, "Distributed and Cloud Computing: Clusters, Grids, Clouds and the Future of Internet", First Edition, Morgan Kaufman Publisher, an Imprint of Elsevier, 2012.
2. Jason Venner, "Pro Hadoop- Build Scalable, Distributed Applications in the Cloud", A Press, 2009.
3. Tom White, "HadoopThe Definitive Guide", First Edition. O"Reilly, 2009.
4. Bart Jacob (Editor), "Introduction to Grid Computing", IBM Red Books, Vervante, 2005.
5. Ian Foster, Carl Kesselman, "The Grid: Blueprint for a New Computing Infrastructure", Morgan Kaufmann, 2nd Edition.
6. Frederic Magoules and Jie Pan, "Introduction to Grid Computing" CRC Press, 2009.
7. 7. Daniel Minoli, "A Networking Approach to Grid Computing", John Wiley Publication, 2005.

MCAS 506 : MACHINE LEARNING

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I **12 Hours**

Introduction - Well-posed learning problems, Designing a learning system, Perspectives and issues in machine learning Concept learning and the general to specific ordering – Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias

UNIT-II **12 Hours**

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Decision Tree learning – Introduction, Decision tree representation, Appropriateproblems for decision tree learning, The basic decision tree learning algorithm, Hypothesisspace search in decision tree learning, Inductive bias in decision tree learning, Issues indecision tree learning Artificial Neural Networks – Introduction, Neural networkrepresentation, Appropriate problems for neural network learning, Perceptions, Multilayernetworks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition Advanced topics in artificial neural networks Evaluation Hypotheses – Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms

UNIT-III **12 Hours**

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Bayesian learning – Introduction, Bayes theorem, Bayes theorem and conceptlearning, Maximum likelihood and least squared error hypotheses, Maximum likelihoodhypotheses for predicting probabilities, Minimum description length principle, Bayes optimalclassifier, Gibs algorithm, Naïve Bayes classifier, An example learning to classify text,Bayesian belief networks The EM algorithm Computational learning theory – Introduction,Probability learning an approximately correct hypothesis, Sample complexity for FiniteHypothesis Space, Sample Complexity for infinite Hypothesis Spaces, The mistake boundmodel of learning - Instance-Based Learning- Introduction, k -Nearest Neighbour Learning,Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks onLazy and Eager Learning Genetic Algorithms – Motivation, Genetic Algorithms, Anillustrative Example, Hypothesis Space Search, Genetic Programming, Models of Evolutionand Learning, Parallelizing Genetic Algorithms

UNIT-IV **12 Hours**

Combining Inductive and Analytical Learning – Motivation, Inductive-AnalyticalApproaches to Learning, Using Prior Knowledge to Initialize the Hypothesis, Using PriorKnowledge to Alter the Search Objective, Using Prior Knowledge to Augment SearchOperators, Reinforcement Learning – Introduction, The Learning Task, Q Learning, Non-Deterministic, Rewards and Actions, Temporal Difference Learning, Generalizing fromExamples, Relationship to Dynamic Programming.

REFERENCE BOOKS

1. Tom M. Mitchell, Machine Learning, MGH.
2. Stephen Marshland, Taylor & Francis, Machine Learning: An Algorithmic Perspective.
3. William WHsieh, Machine Learning Methods in the Environmental Sciences, Neural
4. Networks, Cambridge Univ Press.
5. Richard O. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc., 2001.
6. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995
7. Peter Flach, Machine Learning, Cambridge.

MCAS 507 : INTERNET OF THINGS

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I **12 Hours**

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design ofIoT – IoT Protocols, IoT communication models, Iot Communication APIs IoTenabaledTechnologies – Wireless Sensor Networks, Cloud Computing, Big data analytics,Communication protocols, Embedded Systems, IoT Levels and Templates Domain SpecificIoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and
Lifestyle

UNIT-II **12 Hours**

IoT and M2M – Software defined networks, network function virtualization, differencebetween SDN and NFV for IoT Basics of IoT System Management with NETCOZF, YANGNETCONF,YANG, SNMP NETOPEER

UNIT-III **12 Hours**

Introduction to Python - Language features of Python, Data types, data structures,Control of flow, functions, modules, packaging, file handling, data/time operations, classes,Exception handling Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib

UNIT-IV **12 Hours**

IoT Physical Devices and Endpoints - Introduction to Raspberry PI-Interfaces (serial,SPI, I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins. IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API

REFERENCE BOOKS

1. ArshdeepBahga and Vijay Madisetti,Internet of Things - A Hands-on Approach, Universities Press, 2015.
2. Matt Richardson & Shawn Wallace, O'Reilly (SPD),Getting Started with Raspberry Pi, 2014.

MCAS 508: CRYPTOGRAPHY AND NETWORK SECURITY

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I **12 Hours**

Introduction to information systems, Types of information Systems, Development of Information Systems, Introduction to information security, Need for Information security, Threats to Information Systems, Information Assurance, Cyber Security, and Security Risk Analysis.

UNIT-II **12 Hours**

Application security (Database, E-mail and Internet), Data Security Considerations-Backups, Archival Storage and Disposal of Data, Security Technology-Firewall and VPNs, Intrusion Detection, Access Control. Security Threats -Viruses, Worms, Trojan Horse, Bombs, Trapdoors, Spoofs, E-mail viruses, Macro viruses, Malicious Software, Network and Denial of Services Attack, Security Threats to E-Commerce- Electronic Payment System, e- Cash, Credit/Debit Cards. Digital Signature, public Key Cryptography.

UNIT-III **12 Hours**

Developing Secure Information Systems, Application Development Security, Information Security Governance & Risk Management, Security Architecture & Design Security Issues in Hardware, Data Storage & Downloadable Devices, Physical Security of IT Assets, Access Control, CCTV and intrusion Detection Systems, Backup Security Measures

UNIT-IV **12 Hours**

Security Policies, Why Policies should be developed, WWW policies, Email Security policies, Policy Review Process-Corporate policies-Sample Security Policies, Publishing and Notification Requirement of the Policies. Information Security Standards-ISO, IT Act, Copyright Act, Patent Law, IPR. Cyber Laws in India; IT Act 2000 Provisions, Intellectual Property Law: Copy Right Law, Software License, Semiconductor Law and Patent Law.

REFERENCE BOOKS

1. Charles P. Pfleeger, Shari LawerancePfleeger, “Analysing Computer Security”, Pearson.
2. V.K. Pachghare, “Cryptography and information Security”, PHI Learning Private Limited, Delhi India.
3.Dr. Surya Prakash Tripathi, RitendraGoyal, Praveen Kumar Shukla, “Introduction to Information Security and Cyber Law”, Willey.
4. Schou, Shoemaker, “Information Assurance for the Enterprise”, Tata McGraw Hill.
5. Chander, Harish, “Cyber Laws And It Protection”, PHI.

MCAS 509: NATURAL LANGUAGE PROCESSING

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I **12 Hrs.**

OVERVIEW AND LANGUAGE MODELING : *Overview*: Origins and challenges of NLP-Language and Grammar-Processing Indian Languages- NLP Applications-Information Retrieval. Language Modeling: Various Grammar- based Language Models-Statistical Language Model.

UNIT-II **12 Hrs.**

WORD LEVEL AND SYNTACTIC ANALYSIS : Word Level Analysis: Regular Expressions-Finite-State Automata-Morphological Parsing-Spelling Error Detection and correction-Words and Word classes-Part-of Speech Tagging. Syntactic Analysis: Context-free Grammar-Constituency-Parsing-Probabilistic Parsing.

UNIT-III **12 Hrs.**

SEMANTIC ANALYSIS AND DISCOURSE PROCESSING : Semantic Analysis: Meaning Representation-Lexical Semantics- Ambiguity-Word Sense Disambiguation. Discourse Processing: cohesion-Reference Resolution- Discourse Coherence and Structure.

UNIT-IV **12 Hrs.**

NATURAL LANGUAGE GENERATION AND MACHINE TRANSLATION :
Natural Language Generation: Architecture of NLG Systems- Generation Tasks and Representations- Application of NLG. Machine Translation: Problems in Machine Translation-Characteristics of Indian Languages- Machine Translation Approaches-Translation involving Indian Languages.

REFERENCE BOOKS:

1. Edward Loper, Ewan Klein, and Steven Bird, Natural Language Processing with Python, , O'Reilly Publication 2009.;
2. Christopher D. Manning, Hinrich Schütze ,Foundations of Statistical Natural Language Processing , MIT press,1999.
3. Dan Jurafsky, James H. Martin, Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition, Prentice Hall, 2009.

MCAS510 : EMBEDDED SYSTEMS

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

UNIT-I **12 Hours**

Introduction to embedded systems hardware needs; typical and advanced, timing diagrams, memories (RAM, ROM, and EPROM) Tri state devices, Buses, DMA, UART and PLD's Built-in on the microprocessor. Interrupts basics, ISR; Context saving, shared data problem. Atomic and critical section, Interrupt latency.

UNIT-II **12 Hours**

Survey of software architectures, Round Robin, Function queue scheduling architecture, Use of real time operating system. RTOS, Tasks, Scheduler, Shared data reentrancy, priority inversion, mutex binary semaphore and counting semaphore. Inter task communication, message queue, mailboxes and pipes, timer functions, events Interrupt routines in an RTOS environment.

UNIT-III **12 Hours**

Embedded systems of forwarded sign RTOS Hard real-time and soft real time system principles, Task division, need of interrupt routines, shared data. Embedded Software development tools.

UNIT-IV **12 Hours**

Host and target systems, cross compilers, linkers, locators for embedded systems. Getting embedded software into the target system. Debugging techniques. Testing on host machine, Instruction set emulators, logic analyzers In-circuit emulators and monitors.

REFERENCE BOOKS

1. David A .Simon, An Embedded Software Primer, Pearson Education.
2. Daniel W. Ewis,Fundamentals of Embedded Software Where C and Assembly Meet,Pearson Education.
3. Oliver H. Baileg,Embedded System: Desktop Integrations, Wordware Publishing Inc.
4. Tammy NoergaardNewnes,Embedded System Architecture.

MCAS 511 : ARTIFICIAL INTELLIGENCE

Hours/Week: 4 **I.A. Marks: 30**
Credits : 4 **Exam. Marks: 70**

12 Hours

UNIT-I

Introduction: Artificial Intelligence: Its scope history and applications; AI as Representation and Search- The Predicate calculus-inference rules. Logic based financial adviser; Structures and strategies for state space search– Graph theory, Strategies for search, Using state space to represent reasoning with the predicate calculus.

UNIT-II **12 Hours**

Heuristic search: Heuristic Search: An algorithm for Heuristic Search, Admissibility, Môn tonicity and Informed Heuristics in games, Complexity issues. Control and Implementation of state space research- Recursion based search, Pattern directed search, Production systems, Predicate calculus and Planning, The black board architecture for Problem solving. **Knowledge based systems:** Knowledge-Intensive problem solving: Overview of Expert System technology, Rule-based Expert systems, Model-based reasoning, and Case-based reasoning. The knowledge Representation Problem; Reasoning with uncertain or incomplete information – The Statistical approach to uncertainty, Non-monotonic systems, Reasoning with Fuzzy sets.

UNIT-III **12 Hours**

Knowledge presentation and lisp: Knowledge representation languages, Issues in Knowledge representation, A survey of network representation. Conceptual graphs: A Network representation language, Structured representations. Further issues in knowledge representation; Introduction to LISP–Search in LISP: A functional approach to Farmer, Wolf, Goat, and Cabbage problem. Higher order functions and procedural abstraction, Search strategies in LISP, A Recursive Unification function, Interpreters and Embedded languages. Logic programming in LISP, Streams and delayed evaluation. An expert systems hell in LISP.

UNIT-IV **12 Hours**

Automated reasoning: Automated Reasoning: Weak methods in Theorem proving, The general problem solver and difference tables, Resolution Theorem proving, Further issues in Automated Reasoning; Machine Learning: Connectionist–Foundations for Connectionist Networks, Perceptions learning, Black- propagation learning, Competitive learning, Hebbian Coincidence learning, Attract or Networks or Memories. Machine Learning: Social and Emergent–modes, The Genetic algorithm, Classifier systems and Genetic programming, Artificial life and Society based learning.

REFERENCE BOOKS

1. G.F.LugerandW.A.Stubblefield, Artificial Intelligence – Structures and Strategies for Complex Problem Solving, Addison-Wesley, 1998, Third Edition.
2. P.H.Winston, ArtificialIntelligence, Addision-Wesley, 1992, ThirdEdition.
3. E.RichandKnight, Artificial Intelligence,TataMcGraw Hill,1991, SecondEdition.
4. NilsJ.Nilsson, Artificial Intelligence,ANew Synthesis, Morgan Kaufmann, 2000.

MCAP512 : Data Mining Lab

MCAP513 : Python Programming Lab

MCAP514 : Data Analytics Lab

MCAP515 : Android Applications Lab

MCAP516 : Machine Learning Lab

MCAP517 : Artificial Intelligence Lab