

MCA 501 - SOFTWARE PROJECT MANGEMENT

Module I: Introduction, Project planning and evaluation

Introduction to software project management: importance, activities, categorization, stakeholders. Stepwise overview of project planning. Program management and project evaluation: allocation of resources, cost benefit analysis, evaluation techniques, risk evaluation.

Module II: Different models revisited and Software Effort Estimation

Revisiting waterfall model, V process model, spiral model, software prototyping.

Software effort estimation: software effort estimation techniques, Albrecht function point analysis, Function points Mark II, COSMIC full function points, procedural code oriented approach, COCOMO model.

Module III: Activity Planning and Risk Management

Activity Planning: objectives, projects and activities, sequencing and scheduling activities, network planning models, formulating a network model, forward pass, backward pas, identifying critical path, activity float. Risk management: categories, risk identification, assessment, planning, management, applying PERT techniques, Monte Carlo simulation, critical chain concepts. Resource Allocation: Identifying resource, requirements, scheduling resources, creating critical paths, cost schedule.

Module IV: Monitoring, Control and Team Management

Monitoring and Control: creating framework, collecting data, visualizing progress, cost monitoring, earned value analysis, priority monitoring, change control, Project Closure-role of Closure analysis, performing closure analysis, closure analysis report.

Managing Teams: organizational behaviour, Oldham-Hackman job characteristics model, becoming a team, motivation, decision making, leadership, organizational structures, dispersed and virtual teams.

Module V: Software Quality and Configuration Management

Software Quality: importance, designing, ISO 9126,quality measures, product versus process quality management, external standards, techniques to enhance quality, quality plan .Configuration Management: concepts, configuration management process-planning and set up, performing configuration control, status monitoring and audits.

Text Book:

1. Software Project Management: Bob Hughes& Mike Cotterell. 4th Edition, TataMcGrawHill.

References:

1. Software Project Management: Pankaj Jalote, Pearson Education
2. Software Project Management –A Unified Framework: Walker Royce,Pearson Education.
3. Software Project Management –S A Kelkar .Prentice Hall India
4. Information Technology and Project Management, Schwalbe, Thomson Learning 4Edn.

MCA 502 INTERNET TECHNOLOGY AND APPLICATIONS

Module – 1

Internetworking(Host to Host delivery):- Principles, TCP/IP reference model, Connectionless Internetworking, Internet Protocol(IP). IP addressing: Classful addressing, Classless addressing, Subnetting, Supernetting. Other Network layer Protocols: ARP, RARP, ICMP, IGMP. Autonomous Systems. Unicasting, Unicast Routing Protocols : Interior Gateway Routing Protocol- RIP, OSPF. Exterior Gateway Routing Protocols - BGP.

Module – 2

Multicasting, Multicast applications, Multicast Routing Protocols: MOSPF, DVMRP. Host Configuration Protocols: BOOTP, DHCP.

IPv6 and ICMPv6- Comparison of IPv4 and IPv6.

UDP: Process to Process Communication, User Datagram and Header format, UDP operation, Use of UDP.

TCP:- TCP Services, TCP features, TCP Segment Header, TCP Connection management, TCP State Transition Diagram, Flow Control, Error Control Silly Window Syndrome, TCP Congestion control, TCP timer management.

Module – 3

Domain Name System(DNS) :- Name space, Domain name space, Distribution of name space, DNS in the Internet, Resolution, DNS messages, Types of Records, Compression, DDNS.

TELNET:- Concept, Network Virtual Terminal, Embedding.

File Transfer Protocol(FTP):- Connections, communication, File Transfer, Anonymous FTP.

Trivial File Transfer Protocol (TFTP): Messages, Connection, Data Transfer.

Module – 4

Electronic Mail: Architecture, User agent - Sending Mail, Receiving Mail. Multipurpose Internet Mail Extensions (MIME). Mail transfer agent: SMTP. Mail access protocols: POP and IMAP. Web-based Mail.

World Wide Web- Hypertext and Hypermedia- Browser Architecture- Static documents- HTML- Dynamic Documents- Common Gateway Interface(CGI)- Active Documents.

HTTP:- Transactions, Request messages, Response message, Headers, Some other features.

WAP – Architecture, protocol stack and features.

Module – 5

Multimedia:- Digitizing Audio and Video, Audio and Video compression, Streaming Stored Audio/Video, Streaming Live Audio/Video, Real –Time interactive Audio/Video- Real Time Transport Protocol (RTP), Real Time Transport Control Protocol (RTCP), Video On Demand, Voice Over IP.

Private Networks, Virtual Private Network and Network Address Translation(NAT).

Text books:

Behrouz A. Forouzan - TCP/IP Protocol Suite- Third Edition- Tata McGraw Hill

References:

1. Andrew S Tanenbaum- Computer Networks- PHI- Fourth Edition.
2. Behrouz A. Forouzan – Data Communications and Networking- Fourth Edition- Tata McGraw Hill
3. William Stallings- Data and computer communications- PHI- Seventh Edition.
4. Douglas E. Comer- Internetworking with TCP/IP- Volume I- PHI- Third Edition.
5. Comer, Douglas. The Internet Book: Everything you need to know about computer networking and how the Internet works, 4th Ed., 2007

MCA 503 Linux Internals**Module I**

Introduction to Linux - History, Architecture, Comparison with UNIX, Features and Facilities of Linux, Shells in Linux, Different Variants of Linux — Red Hat, Ubuntu, Mandrake, Debian, Susse

Module II

Files and File Structure - Linux File System, File naming Conventions, Path, Types of file names and Users, Directory Commands, File Commands in Linux, Text Editors-Functions of a Text Editor, Various Editors, vi Editor, emacs Editor, joe Editor, Locating Files, Standard Files, Redirection, Filters, Pipes

Module III

File Access Permissions [FAP], Viewing and Changing FAPs, Introduction to Shells, Shell variables- Local and Global Variables, Command Substitution - expr command, arithmetic expansion, Conditional Execution Constructs, Iterations, Parameter Handling in shell scripts, shift command, controlling process execution, scheduling tasks

Module IV

Backup, restore and Compress utilities, tar, cpio, dump and restore utilities, Communication in Linux — mesg, who-T, talk, write, wall, finger, chfn, ping, traceroute utilities, FTP , ncftp command, email facilities

Module V

X-Window System - X desktop, GNOME desktop Environment - features, GNOME panel, Control Center — Capplets, Document Handlers, Multimedia Cappellet, Peripherals, File Manager K Desktop environment — Interface, Desktop, Panel, Konqueror, Koffice, Kmail, KDE Control Center, Kjots, Kdiskfree.

Text Book

Operating System - Linux, NUT Press, PHI Publisher, 2006 Edition

Reference

1. Introduction to Unix / Linux, Diaz , Thomson Learning 1Edn.
2. Unix - Shell Programming, Yeshwant Kanetkar, BPB Publishers

MCA 504 : DATA MINING AND WAREHOUSING

Module I - Introduction to Data mining & Data Warehouse

What is Data mining, Data mining -On What kinds of Data, Data mining Functionalities, Classification of Data mining Systems, Data Mining Task Primitives, Integration of Data mining systems, Major issues of Data mining, What is Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data warehouse Implementation, From Data Warehouse to Data mining.

Module II -Classification and Prediction

Introduction to Classification and Prediction, Issues Regarding Classification and Prediction
Classification by Decision Tree Induction: Decision Tree induction, Tree Pruning, Scalability and Decision Tree Induction, **Rule Based Algorithms:** Using If - Then rules of Classification, Rule Extraction from a Decision Tree, Rule Induction Using a Sequential Covering algorithm
Prediction : Linear Regression, Nonlinear Regression, Other Regression-Based Methods

Module III -Association Rules and Clustering

Basic Concepts, Efficient and Scalable Frequent Item set Mining Methods : Apriori Algorithm, Generating association Rules from Frequent Itemsets, Improving the Efficiency of Apriori, **Mining Various Kinds of Association Rules:** Mining Multilevel Association Rules, Mining Multilevel association Rules from Relation Databases and Data Warehouses, From Association Mining to Correlation Analysis

What is Cluster Analysis, Requirements of Cluster Analysis' Types of Data in Cluster Analysis, Categorization of Major Clustering Methods, **Partitioning Methods :**k-Means and k- Medoids, From K-Medoids to CLARANS , **Hierarchical Method :** Agglomerative and Divisive Hierarchical Clustering, BIRCH, ROCK, Chameleon, **Grid Based Methods:** STING : Statistical Information Grid, Wave Cluster

Module IV -Mining Complex Data

Spatial Datamining: Spatial Data cube construction and Spatial OLAP, Mining Spatial association and Co-location patterns, Spatial clustering methods, Spatial classification and spatial trend analysis, Mining raster databases.

Multimedia Datamining: Similarity search in multimedia data, Multidimensional analysis of multimedia data, Classification and prediction analysis of multimedia data, Audio and Video Datamining.

Text Mining : Text data analysis and information retrieval, Dimensionality reduction for text, Text mining approaches,

Mining the World Wide Web : Mining the web page layout structure, Mining the web's link structure to identify authoritative web pages, Web usage mining.

Module V-Applications and Trends in Data Mining

Data Mining Applications : Data Mining for Financial Data Analysis, Data Mining for the Retail Industry, Data Mining for the Telecommunication Industry, Data Mining for Biological Data Analysis, Data Mining in Other Scientific Applications, Data Mining for Intrusion Detection, Social Impacts of Data Mining, Trends in Data Mining

Text Books:

Data Mining Concepts and Techniques – Jiawei Han and Micheline Kamber, Second Edition, Elsevier, 2006

Reference Books:

1. Data Mining – BPB Editorial Board, BPB Publications, First Edition, 2004
2. Data Warehousing , Data Mining, & OLAP – Alex Berson, Stephen J Smith, Tata McGraw Hill, 2004
3. Data Warehousing, Sinha, Thomson Learning , 1Edn.

**MCA 505(A) - ADVANCED COMPUTER ARCHITECTURE &
PARALLEL PROCESSING
(Elective-II)**

Module- I

Parallel Processing :Evolution of Computer systems- Parallelism in Uniprocessor-Parallel Computer Structures-Architectural Classification Scheme-Parallel Processing Applications

Module- II

Principles of pipelining and vector processing:,Linear pipelining-classification of pipeline processors-general pipelines, instructions and arithmetic pipelines dynamic pipelines,vector processing requirements

Pipeline Computers and Vectorization methods Architecture of CRAY-I, Vectorization & Optimization Methods

Module- III

Array Processors:SIMD Array Processors, Interconnection Networks, Parallel Algorithm for Array Processors, Associative Array Processing

Module- IV

Multiprocessor Architecture and Programming:Functional Structures ,Interconnection Networks, Parallel Memory Organizations, Multi Processor Operating Systems, Exploiting Concurrency for Multi Processing

Module- V

Data Flow Computers: Data driven Computing and Languages, Data Flow Computers Architectures

Case study of any one modern Microprocessor

Textbooks:

- 1.. Computer Architecture and parallel processing-Kai Hwang & Faye A Briggs(McGraw Hill), International Edition 1985

References:

1. Computer Architecture, Michael. J Flynn, Narosa Publications

MCA 505(B) Distributed Computing (Elective-II)

Module I

Introduction :definitions, motivation Communication Mechanisms communication protocols, RPC, RMI, stream oriented communication

Module II

Distributed Algorithms :snapshots, leader election, etc. Naming generic schemes, DNS,naming and localization Synchronization traditional synchronization, lock free, clocks (vector clocks)

Module III

Replication and Coherence consistency models and protocols Fault Tolerance group communication, two- and three-phase commit, checkpointing

Module IV

Security :threats, control mechanisms, systems Distributed File Systems NFS, Coda, etc. Parallel Architecture Systems

Module V

Middleware :Publish/Subscribe, CORBA, Jini, mobile systems

Text Books

1. Tannenbaum , Andrew S, and Maarten VanSteen. Distributed Systems: Principles and Paradigms. 4th ed. Prentice Hall India,
2. Garg, Vijay K. Elements of Distributed Computing. Wiley,

CA 505(C) - ARTIFICIAL INTELLIGENCE (Elective – II)

Module I

Introduction to Artificial Intelligence.

Overview of AI - AI Problems, Assumptions, Techniques, Level of Model, and Criteria for success.

Problems, Problem spaces and Search - Problem Definition, Production systems, Problem characteristics, Production system characteristics.

AI languages – Introduction to LISP & PROLOG

Module II

Knowledge Representation Schemes.

Formalized Symbolic Logics - Syntax and Semantics of Propositional and Predicate logic, Properties of WFFS, Conversion to clausal form, Inference rules, Resolution, Non- Deductive Inference Method.

Inconsistencies and Uncertainties – Non-monotonic reasoning, Truth Maintenance system, Default reasoning and the closed world assumption.

Structured Knowledge - Associative Networks, Frame Structures, Conceptual Dependencies and scripts

Overview of Object Oriented Systems - Objects, Classes, Messages and Methods.

Module III

Knowledge Organization and Management

Search and Control Strategies - Examples of search problem, Uniformed or Blind search, Informed search, Searching AND-OR graphs.

Matching Techniques - Structures used for matching, Measures for Matching, Matching like patterns, Fuzzy matching algorithm, RETE Algorithm.

Knowledge Organization and Management – Indexing and retrieval techniques, Integrating knowledge in memory, Memory organization systems.

Module IV

Knowledge Acquisition

General Concepts in Knowledge Acquisition - Types of learning, Difficulty in Knowledge Acquisition, General learning model, Performance measures.

Early work in Machine Learning – Perceptrons, Checkers playing example, Learning automata, Genetic algorithms, Intelligent editors.

Analogical and Explanation Based Learning – Analogical Reasoning and learning, Examples, Explanation based learning.

Module V

AI Application

Natural Language Processing - Overview of Linguistics, Grammars and Languages, Basic Parsing Techniques, Semantic Analysis and Representation structures, Natural Language generation, Natural language systems.

Patterns Recognition - Recognition and Classification process, Classification pattern, Recognizing and Understanding speech.

Experts system Architectures – Rule-based system, Non production system, Dealing with uncertainty, Knowledge acquisition and validation, Knowledge system Building Tools.

Text Books

1. Introduction to Artificial intelligence and expert systems by Dan W. Patterson, Prentice Hall India (All Modules).
2. Artificial Intelligence, Elaine Rich, Mc Graw Hill (Module 1).

References

1. Principles of Artificial Intelligence, Nilson. N.J, Springer Verlag
2. Introduction to Artificial Intelligence, Charvanak E. and Mc Dermoti D, Addison Wesley
3. Artificial Intelligence and Intelligent Systems by N.P Pandhy. Oxford Publications.

MCA 505(D) -Cryptography & Network Security (Elective-II)

Module I

Introduction. CONVENTIONAL ENCRYPTION, Conventional Encryption: Classical Techniques.

Conventional Encryption: Modern Techniques. Conventional Encryption: Algorithms. Confidentiality Using Conventional Encryption.

Module II

PUBLIC-KEY ENCRYPTION AND HASH FUNCTIONS. Public-Key Cryptography and RSA, Introduction to Number Theory, Message Authentication and Hash Functions, Hash and Mac Algorithms., Digital Signatures and Authentication Protocols, Key Management , Secret Sharing , Interactive proof

Module III

NETWORK and SYSTEM SECURITY PRACTICE. Authentication applications, Electronic Mail Security. ,IP Security.and/or Web Security

Module IV

Hardware Solutions: Cryptographic Accelerator, Authentication Tokens, Smart Cards, Biometrics

Module V

Intruders and Viruses ,Firewalls , Digital cash ,Secret sharing schemes ,Zero-knowledge techniques, Folklore

Text book:

1. Stallings, W., Cryptography and Network Security. Principles and Practice, 4th edition, Prentice Hall.
2. Steve Burnett & Stephen Paine RSA Security's Official Guide to Cryptography, Tata Mc GrawHill

References:

1. Information Security- Intelligence: Cryptographic Principles and Applications. Calabrese, Thomson Learning 1Edn.
2. Kaufman, C., Perlman, R., Speciner, M., Network security. Private communication in a public worlds, Prentice Hall, 2002.
3. Trappe, W., Washington, L.C., Introduction to Cryptography with coding theory, Pearson-Prentice Hall, 2006.
4. Tanenbaum, A.S., Computer Networks, 4th edition, Prentice Hall,
Stinson, D., Cryptography. Theory and Practice, 2nd edition, CRC Press.

Online resources

1. Online resources of Stallings's Cryptography and Network Security. Principles and Practice
<http://williamstallings.com/Crypto3e.html>

2. Online resources of Menez, van Oorschot, Vanstone's Handbook of Applied Cryptography available at <http://www.cacr.math.uwaterloo.ca/hac/>

MCA 505(E) - MULTIMEDIA SYSTEMS (Elective-II)

Module 1

Multimedia-Introduction, Multimedia Presentation and Production, Characteristics, Hardware and Software requirements, Uses of Multimedia, Analog Representation, Digital Representation, A-D Conversion, D-A Conversion, Sampling Rate, Bit Depth, Quantization Error, Fourier Representation

Module 2

Text-Types, Font, Text Compression, File Formats, Image-Types, Color Models, Steps in image processing, Interface standards, Specifications of digital images, CMS, File Formats, Audio-Acoustics, Nature of Sound waves, Elements of Audio systems, MIDI, Sound Card, Audio File Formats, Video-Video camera, Transmission of video signals, Digital video standards, Video File formats

Module 3

Animation-Keyframes, Tweening, types, Animation on Web,3D Animation, File Formats, Compression-CODEC, Lossless compression techniques, Lossy compression techniques,JPEG,MPEG-1 Audio,MPEG-1 Video, CD-Technology-Compact Discs, Magneto optical discs, Laser Disc, DVD,DVD Formats

Module 4

Multimedia Architecture-User interfaces, Hardware support, Streaming Technologies, MMDBS, Object oriented approach Multimedia Documents-SGML, ODA, MHEG

Module 5

Multimedia Application Development-Software Life Cycle overview, Story, Flowline, Script, Storyboard, Case study, Virtual Reality-VR Applications, software requirements, VRML

TEXT BOOK

1. Ranjan Parekh, "Principles of Multimedia", Tata McgrawHill,2006

REFERENCES

1. Nigel Chapman & Jenny Chapman, "Digital Multimedia", Wiley Publications.
2. Ralf Steinmetz and Klara Nahrstedt, "Multimedia Systems", Springer,2004
3. Tay Vaughan, "Multimedia: Making it work", Seventh Edition, Tata McGraw-Hill Publishing company Ltd, 2007
4. Fred Halsall, "Multimedia Communication-Application Networks, Protocols and Standard", Addison-Wesley, 2001.
5. Steve Heath ,Multimedia and Communication Technology,,Second Edition,Elsevier,2003
6. Rosch , "Multimedia Bible" Sams Publishing
7. Fred T.Hofstetter, "Multimedia Literacy",Third Edition, Tata McGraw-Hill, 2005
8. Multimedia:Computing,Communications and Applications, Ralf Steinmetz and Klara Nahrstedt,Pearson Education,2006.

MCA 505(F) BIOINFORMATICS **(Elective II)**

Module I

Biology for Bioinformatics :- Basic concepts - cells- Archaeobacteria, Biomembranes, Nucleus, Organelles, Mitochondria, Chloroplasts, Viruses, BacterioPhage, Genetic contents of a cell - Viral Proteins - Amino acid, DNA and RNA - Forms of DNA.

Module II

Genetic Code :- Genome - Gene Expressions - Protein Synthesis - Transcription RNA - Processing- Capping- Splicing - Editing, Cell Signalling, DNA cloning Genomic library - cDNA library - Probes - Screening.

Module III

Databases :- Characteristics of Bioinformatics, Database - Categorizing, Navigating, Information Retrieval systems, Sequence Databases, Structure Databases.

Module IV

Other Databases :- Enzyme Databases, MEROPS, BRENDA, Pathway Databases: CAZy, Disease Databases, Literature Databases, Other specified Databases.

Module V

Python for Bioinformatics.

Text Books :-

1. BIOINFORMATICS Databases, Tools and Algorithms., Orpita Bosu, Simminder Kaur Thukral., Oxford University Press.
2. Learning Python., Mark Lutz & david Ascher., O'Reilly.

References :-

1. Introduction to Bioinformatics., T. K. Attwood, D J Parry-Smith., Pearson Education.
2. Essential Bioinformatics., Jin Xiong., Cambridge University Press.
3. Fundamental Concepts of Bioinformatics., Dan E. Krane, Michael L. Raymer., Pearson Education.

MCA 505(G) - Digital Image Processing **(Elective -II)**

Module I

Introduction: What is Digital Image Processing(DIP), origin, examples, fundamental steps in DIP, components.

Digital Image Fundamentals: Elements of visual perception, image sensing and acquisition, image sampling and quantization, basic relationships between pixels.

Module II

Image enhancement in the spatial domain: Basic gray level transformations, basics of spatial filtering, smoothing of spatial filtering, sharpening spatial filters.

Module III

Image enhancement in the frequency domain: Introduction to the Fourier transform and frequency domain, smoothing frequency domain filters, sharpening frequency domain filters.

Module IV

Image restoration: A 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, estimating the degradation function, inverse filtering.

Color image processing: Color fundamentals and models, basics of full-color image processing, color transformations, smoothing and sharpening, color segmentation, noise in color images, color image compression.

Module V

Image compression: Fundamentals, image compression models, error-free compression, lossy compression, image compression standards.

Image segmentation: Detection of discontinues, edge linking and boundary detection, thresholding, region-based segmentation, segmentation by morphological watersheds, use of motion in segmentation.

Text Book:

Digital Image Processing, 2nd Edition, by Rafael C. Gonzalez and Richard E. Woods, Pearson Education, Inc., 2002.

Reference

1. Image Processing Analysis and Machine Vision, Milan Sonka, Thomson Learning 2Edn.
2. Fundamentals of Digital Image Processing, by Anil K. Jain, Prentice-Hall, 1989.

MCA 506 Linux Lab

1. Installing Linux OS - Logging in and out, Creating user accounts, Changing passwords, getting help with MAN command
2. Basic Overview about the various commands - cal, chm, date, finger, groups, help, hostname, hwclock, rwho, tzselect, uname,w,whatis, whoami, bash, bind, kill, nice, set, source, fc, echo, cd, file, find, his, vdir, xargs, chgrp, In, mkdir, rmdir, safedelete, we, touch, compress, gpg, bunzip2, mcrrypt, mount, unmount, cksum, eqn, strfile, grep, fgrep, groff, troff, zcat, uniq, rev, awk, sed

3. Navigating the Linux file system
4. Creating files and directories
5. Using Text editors - emacs, joe, vi, pico
6. Working with Hard disk drives and Peripherals
7. Basic shell programming — Shell Scripts, Writing Shell programs, using shell variables, make options,
8. Managing users and groups
9. Using LILO and LOADLIN, GRU