

Dr.A.P.J.Abdul
kalam Technical University, Uttar Pradesh, Lucknow
 (Formerly Uttar Pradesh Technical University)
STUDY EVALUATION SCHEME
INFORMATION TECHNOLOGY
YEAR forth, SEMESTER –VII
(Effective from the session: 2016-17)

S.No.	Subject Code	Subject	Period	Evaluation Scheme				Total	Credit
				Sessional			Exam		
				CT	TA	Total			
1		<u>Open Elective I</u>	2-0-0	15	10	25	50	75	2
2		<u>Open Elective II</u>	3-1-0	30	20	50	100	150	4
3	NEIT-701	Cryptography & Network Security	3-1-0	30	20	50	100	150	4
4	NECS-702	Artificial Intelligence	3-1-0	30	20	50	100	150	4
5		<u>Departmental Elective III</u>	3-1-0	30	20	50	100	150	4
<u>Practical / Training / Projects</u>									
6	NEIT-751	Cryptography & Network Security*	0-0-2	-	25	25	25	50	1
8	NECS-752	Project	0-0-8	-	50	50	100	150	4
9	NECS-753	Industrial Training	0-0-3	-	75	75	-	75	2
10	GP-701	General Proficiency	-	-	-	-	-	50	

1. Practical Training done after 6th Semester would be evaluated in 7th semester through Report and Viva-voce.
2. Project has to be initiated in 7th semester beginning and completed by the end of 8th semester with proper report and demonstration.

* At least 10 problems are to be considered based on corresponding theory course.

Dr.A.P.J.Abdulkalam Technical University,UttarPardesh,Lucknow
 (Formerly Uttar Pradesh Technical University)
STUDY EVALUATION SCHEME
INFORMATION TECHNOLOGY
YEAR forth, SEMESTER –VIII
(Effective from the session: 2016-17)

SNo	Subject Code	Subject	Period	Evaluation Scheme				Total	Credit
				Sessional			Exam		
				CT	TA	Total			
1		<u>Open Elective III</u>	3-1-0	30	20	50	100	150	4
2	NEIT-801	Mobile Computing	3-1-0	30	20	50	100	150	4
3		<u>Departmental Elective IV</u>	3-1-0	30	20	50	100	150	4
4	NECS-085- NECS-088 NEIT-083	<u>Departmental Elective V</u>	3-1-0	30	20	50	100	150	4
Practicals / Training /Projects									
5	NEIT-851	Mobile Computing	0-0-2	-	25	25	25	50	1
6	NECS-852	Project	0-0-12	-	100	100	200	300	6
7	GP-801	General	-	-	-	-	-	50	

** At least 10 problems are to be considered based on corresponding theory course.*

Open Elective I

1. NEOE-070 Mobile Application Development
2. NEOE-071 Ethical Hacking and Prevention
3. NEOE-072 Software Project Management

Open Elective II

1. NEOE-073 Software Testing and Audit
2. NEOE-075 Computer Vision
3. NEOE-076 IT in Forensic Science

Open Elective III

1. NEOE-081 Cloud Computing
2. NEOE-082 Virtual Reality
3. NEOE-083 Fundamental of Machine Learning

Departmental Elective III

1. NECS-071 High Speed Network
2. NECS-072 Android Operating System
3. NECS-073 Service Oriented Architecture
4. NECS-701 Distributed System
5. NEOE-074 Neural Network

Departmental Elective IV

1. NECS-080 Pattern Recognition
2. NECS-082 Real Time System
3. NECS-084 Grid Computing
4. NECS-801 Digital Image Processing
5. NEIT-802 Natural Language Processing

Departmental Elective V

1. NECS-085 Data Compression
2. NECS-087 Embedded Systems
3. NECS-088 Semantic Web and Web
Services
4. NEIT-803 Software Quality Engineering
5. NEIT-804 Software Reliability

MOBILE APPLICATION DEVELOPMENT

NEOE-070

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UNIT I

5

INTRODUCTION: Introduction to mobile applications – Embedded systems - Market and business drivers for mobile applications – Publishing and delivery of mobile applications – Requirements gathering and validation for mobile applications

UNIT II

10

BASIC DESIGN: Introduction – Basics of embedded systems design – Embedded OS - Design constraints for mobile applications, both hardware and software related – Architecting mobile applications – User interfaces for mobile applications – touch events and gestures – Achieving quality constraints – performance, usability, security, availability and modifiability.

UNIT III

10

ADVANCED DESIGN: Designing applications with multimedia and web access capabilities – Integration with GPS and social media networking applications – Accessing applications hosted in a cloud computing environment – Design patterns for mobile applications.

UNIT IV

10

TECHNOLOGY I – ANDROID: Introduction – Establishing the development environment – Android architecture – Activities and views – Interacting with UI – Persisting data using SQLite – Packaging and deployment – Interaction with server side applications – Using Google Maps, GPS and Wifi – Integration with social media applications.

UNIT V

10

TECHNOLOGY II – iOS: Introduction to Objective C – iOS features – UI implementation – Touch frameworks – Data persistence using Core Data and SQLite – Location aware applications using Core Location and Map Kit – Integrating calendar and address book with social media application – Using Wifi - iPhone marketplace. Swift: Introduction to Swift, features of swift.

TOTAL LECTURE: 45

TEXT BOOKS:

1. Charlie Collins, Michael Galpin and Matthias Kappler, “Android in Practice”, DreamTech, 2012
2. AnubhavPradhan , Anil V Deshpande Composing Mobile Apps, Learn , explore, apply
3. James Dovey and Ash Furrow, “Beginning Objective C”, Apress, 2012
4. Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012
5. David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, “Beginning iOS 6 Development: Exploring the iOS SDK”, Apress, 2013.

ETHICAL HACKING AND PREVENTION

NEOE-071

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Unit-I

10

Ethical Hacking: Introduction, Networking & Basics, Foot Printing, Google Hacking, Scanning, Windows Hacking, Linux Hacking, Trojans & Backdoors, Virus & Worms,

Unit-III10

Proxy & Packet Filtering, Denial of Service, Sniffer, Social Engineering, System and Network Vulnerability and Threats to Security, Various types of attack and the various types of attackers in the context of the vulnerabilities associated with computer and information systems and networks Physical Security, Steganography,

Unit-III

10

Cryptography, Wireless Hacking, Firewall & Honeypots, IDS & IPS, Vulnerability, Penetration Testing, Session Hijacking, Hacking Web Servers, SQL Injection, Cross Site Scripting, Exploit Writing, Buffer Overflow,

Unit-IV15

Reverse Engineering, Email Hacking, Incident Handling & Response, Bluetooth Hacking, Mobile Phone Hacking, Basic ethical hacking tools and usage of these tools in a professional environment. Legal, professional and ethical issues likely to face the domain of ethical hacking. ethical responsibilities, professional integrity and making appropriate use of the tools and techniques associated with ethical hacking.

TOTAL LECTURE: 45

Text Books:

1. Dominic Chell, Tyrone Erasmus, Shaun Colley, Ofie Whitehouse, The Mobile Application Hacker's Handbook, Wiley
2. Michael Gregg, "Certified Ethical Hacker (CEH) Cert Guide", Pearson India, 2014
3. Rafay Baloch, "Ethical Hacking and Penetration Testing Guide" CRC Press
4. Allen Harper, Shome Harris, Jonathan Ness, Chris Eagle, Gideon Lenkey, Terron Williams "Gray Hat Hacking The Ethical Hackers Handbook." TMH
5. Patrick Engebretson, "The Basics of Hacking and Penetration Testing, Second Edition: Ethical Hacking and Penetration Testing Made Easy, 2nd Edition, Elsevier
6. Jon Erickson "HACKING, The art of Exploitation", William Pollock.

SOFTWARE PROJECT MANAGEMENT

NEOE-072

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UNIT-I: Introduction and Software Project Planning5

Fundamentals of Software Project Management (SPM), Need Identification, Vision and Scope document, Project Management Cycle, SPM Objectives, Management Spectrum, SPM Framework, Software Project Planning, Planning Objectives, Project Plan, Types of project plan, Structure of a Software Project Management Plan, Software project estimation, Estimation methods, Estimation models, Decision process.

UNIT-II: Project Organization and Scheduling10

Project Elements, Work Breakdown Structure (WBS), Types of WBS, Functions, Activities and Tasks, Project Life Cycle and Product Life Cycle, Ways to Organize Personnel, Project schedule, Scheduling Objectives, Building the project schedule, Scheduling terminology and techniques, Network Diagrams: PERT, CPM, Bar Charts: Milestone Charts, Gantt Charts.

UNIT-III: Project Monitoring and Control 10

Dimensions of Project Monitoring & Control, Earned Value Analysis, Earned Value Indicators: Budgeted Cost for Work Scheduled (BCWS), Cost Variance (CV), Schedule Variance (SV), Cost Performance Index (CPI), Schedule Performance Index (SPI), Interpretation of Earned Value Indicators, Error Tracking, Software Reviews, Types of Review: Inspections, Deskchecks, Walkthroughs, Code Reviews, Pair Programming.

UNIT-IV: Software Quality Assurance and Testing10

Testing Objectives, Testing Principles, Test Plans, Test Cases, Types of Testing, Levels of Testing, Test Strategies, Program Correctness, Program Verification & validation, Testing Automation & Testing Tools, Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and Indicators, The SEI Capability Maturity Model CMM), SQA Activities, Formal SQA Approaches: Proof of correctness, Statistical quality assurance, Cleanroom process.

UNIT-V: Project Management and Project Management Tools 10

Software Configuration Management: Software Configuration Items and tasks, Baselines, Plan for Change, Change Control, Change Requests Management, Version Control, Risk Management: Risks and risk types, Risk Breakdown Structure (RBS), Risk Management Process: Risk identification, Risk analysis, Risk planning, Risk monitoring, Cost Benefit Analysis, Software Project Management Tools: CASE Tools, Planning and Scheduling Tools, MS-Project.

TOTAL LECTURE: 45

Text Books:

1. M. Cotterell, Software Project Management, Tata McGraw-Hill Publication.
2. Royce, Software Project Management, Pearson Education
3. Kieron Conway, Software Project Management, Dreamtech Press
4. S. A. Kelkar, Software Project Management, PHI Publication.
5. Harold R. Kerzner, Project Management "A Systems Approach to Planning, Scheduling, and Controlling" Wiley.
6. Mohapatra, Software Project Management, Cengage Learning.

SOFTWARE TESTING AND AUDIT

NEOE-073

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Unit-I

Review of Software Engineering:10

Overview of software evolution, SDLC, Testing Process, Terminologies in Testing: Error, Fault, Failure, Verification, Validation, Difference between Verification and Validation, Test Cases, Testing Suite, Test Oracles, Impracticality of Testing All data; Impracticality of testing AllPaths.

Verification:

Verification methods, SRS verification, Source code reviews, User documentation verification, Software project audit, Tailoring Software Quality Assurance Program by Reviews, Walkthrough, Inspection, and Configuration Audits.

Unit –II

Functional Testing::10

Boundary Value Analysis, Equivalence Class Testing, Decision Table Based Testing, Cause Effect Graphing Technique.

Structural Testing:

Control flow testing, Path testing, Independent paths, Generation of graph from program, Identification of independent paths, Cyclomatic Complexity, Data Flow Testing, Mutation Testing.

Unit-III

Regression Testing::10

What is Regression Testing? Regression Test cases selection, Reducing the number of test cases, Code coverage prioritization technique.

Reducing the number of test cases:

Prioritization guidelines, Priority category, Scheme, Risk Analysis.

Unit-IV:10

Software Testing Activities: Levels of Testing, Debugging, Testing techniques and their Applicability, Exploratory Testing

Automated Test Data Generation:

Test Data, Approaches to test data generation, test data generation using genetic algorithm, Test Data Generation Tools, Software Testing Tools, and Software test Plan.

Unit-V:5

Object oriented Testing: Definition, Issues, Class Testing, Object Oriented Integration and System Testing.

Testing Web Applications: What is Web testing?, User interface Testing, Usability Testing, Security Testing, Performance Testing, Database testing, Post Deployment Testing. **(8 hrs)**

TOTAL LECTURE: 45

Text Books:

1. Yogesh Singh, “Software Testing”, Cambridge University Press, New York, 2012
2. K.K. Aggarwal&Yogesh Singh, “Software Engineering”, New Age International Publishers, New Delhi, 2003.
3. Roger S. Pressman, “Software Engineering – A Practitioner’s Approach”, Fifth Edition, McGraw-Hill International Edition, New Delhi, 2001.
4. Marc Roper, “Software Testing”, McGraw-Hill Book Co., London, 1994.

5. Boris Beizer, "Software System Testing and Quality Assurance", Van NostrandReinhold, New York, 1984.

COMPUTER VISION

NEOE-075

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UNIT 1

IMAGE FORMATION MODEL

10

Monocular Imaging System, Orthographic & Perspective Projection, Camera model and Camera calibration , Binocular imaging systems

UNIT 2

IMAGE PROCESSING AND FEATURE EXTRACTION

10

Image representations (continuous and discrete), Edge detection

UNIT3

MOTION ESTIMATION

5

Regularization Theory, Optical Computation, Stereo Vision, Motion Estimation, Structure from Motion.

UNIT 4

SHAPE REPRESENTATION AND SEGMENTATION

10

Shape Representation and Segmentation, Deformable curves and surfaces, Snakes and active contours, Level set representations, Fourier and Wavelet Descriptors, Medial Representations ,Multiresolution analysis

UNIT 5

OBJECT RECOGNITION

10

Hough transforms and other simple object recognition Methods, Shape Correspondence and Shape Matching, Principal component analysis , Shape priors for recognition

TOTAL LECTURE: 45

Text Books:

1. Richard Szeliski, Computer Vision: Algorithms and Applications, 2010
2. Forsyth and Ponce, Computer Vision, A Modern Approach, 2nd ed., 2011
3. Trucco and Verri, Introductory Techniques for 3D Computer Vision, 1998
4. David A. Forsyth, "Computer Vision: : A Modern Approach", 2nd Edn, Pearson India 2015

IT IN FORENSIC SCIENCE

NEOE-076

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UNIT I 8

Overview of Biometrics, Biometric Identification, Biometric Verification, Biometric Enrollment, Biometric System Security. Authentication and Biometrics: Secure Authentication Protocols, Access Control Security Services, Matching Biometric Samples, Verification by humans. Common biometrics: Finger Print Recognition, Face Recognition, Speaker Recognition, Iris Recognition, Hand Geometry, Signature Verification

UNIT II 8

Introduction to Information Hiding: Technical Steganography, Linguistic Steganography, Copy Right Enforcement, Wisdom from Cryptography Principles of Steganography: Framework for Secret Communication, Security of Steganography System, Information Hiding in Noisy Data , Adaptive versus non-Adaptive Algorithms, Active and Malicious Attackers, Information hiding in Written Text.

UNIT III 8

A Survey of Steganographic Techniques: Substitution systems and Bit Plane Tools, Transform Domain Techniques: - Spread Spectrum and Information hiding, Statistical Steganography, Distortion Techniques, Cover Generation Techniques. Steganalysis: Looking for Signatures: - Extracting hidden Information, Disabling Hidden Information.

UNIT IV 12

Watermarking and Copyright Protection: Basic Watermarking, Watermarking Applications, Requirements and Algorithmic Design Issues, Evaluation and Benchmarking of Watermarking system. Transform Methods: Fourier Transformation, Fast Fourier Transformation, Discrete Cosine Transformation, Mellin-Fourier Transformation, Wavelets, Split Images in Perceptual Bands. Applications of Transformation in Steganography.

UNIT V 8

Computer Forensics, Rules of evidence, Evidence dynamics, Evidence collection, Data recovery, Preservation of digital evidence, surveillance tools for future warfare,

TOTAL LECTURE: 44

Text Books:

1. Katzendbisser, Petitcolas, " Information Hiding Techniques for Steganography and Digital Watermarking", Artech House.
2. Peter Wayner, "Disappearing Cryptography: Information Hiding, Steganography and Watermarking 2/e", Elsevier
3. Bolle, Connell et. al., "Guide to Biometrics", Springer
4. John Vecca, "Computer Forensics: Crime scene Investigation", Firewall Media 5. Christopher L.T. Brown, "Computer Evidence: Collection and Preservation", Firewall Media

CRYPTOGRAPHY & NETWORK SECURITY

NEIT-701

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Unit-I

10

Introduction to security attacks, services and mechanism, Classical encryption techniques-substitution ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers.

Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion, feistel structure, Data encryption standard(DES), Strength of DES, Idea of differential cryptanalysis, block cipher modes of operations, Triple DES

Unit-II

10

Introduction to group, field, finite field of the form $GF(p)$, modular arithmetic, prime and relative prime numbers, Extended Euclidean Algorithm,

Advanced Encryption Standard (AES) encryption and decryption Fermat's and Euler's theorem, Primarily testing, Chinese Remainder theorem, Discrete Logarithmic Problem, Principals of public key crypto systems, RSA algorithm, security of RSA

Unit-III

10

Message Authentication Codes: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions, Secure hash algorithm (SHA)

Digital Signatures: Digital Signatures, Elgamal Digital Signature Techniques, Digital signature standards (DSS), proof of digital signature algorithm,

Unit-IV

10

Key Management and distribution: Symmetric key distribution, Diffie-Hellman Key Exchange, Public key distribution, X.509 Certificates, Public key Infrastructure.

Authentication Applications:

Kerberos, Electronic mail security: pretty good privacy (PGP), S/MIME.

Unit-V

10

IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management.

Introduction to Secure Socket Layer, Secure electronic, transaction (SET)

System Security: Introductory idea of Intrusion, Intrusion detection, Viruses and related threats, firewalls

TOTAL: 45 PERIODS

Text Books:

1. William Stallings, "Cryptography and Network Security: Principals and Practice", Pearson Education.
2. Behrouz A. Frouzan: Cryptography and Network Security, Tata McGraw Hill
3. C K Shyamala, N Harini, Dr. T.R.Padmnabhan Cryptography and Security ,Wiley
4. Bruce Schiener, "Applied Cryptography". John Wiley & Sons
5. Bernard Menezes," Network Security and Cryptography", Cengage Learning.
6. AtulKahate, "Cryptography and Network Security", Tata McGraw Hill

ARTIFICIAL INTELLIGENCE

NECS-702

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Unit-I

Introduction : Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents. Computer vision, Natural Language Processing.

Unit-II

Introduction to Search : Searching for solutions, Uniformed search strategies, Informed search strategies, Local search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha - Beta pruning.

Unit-III

Knowledge Representation & Reasoning: Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks.

Unit-IV

Machine Learning : Supervised and unsupervised learning, Decision trees, Statistical learning models, Learning with complete data - Naive Bayes models, Learning with hidden data - EM algorithm, Reinforcement learning,

Unit-V

Pattern Recognition : Introduction, Design principles of pattern recognition system, Statistical Pattern recognition, Parameter estimation methods - Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA), Classification Techniques – Nearest Neighbor (NN) Rule, Bayes Classifier, Support Vector Machine (SVM), K – means clustering.

TOTAL LECTURE: 45

Text Books:

1. Stuart Russell, Peter Norvig, “Artificial Intelligence – A Modern Approach”, Pearson Education
2. Elaine Rich and Kevin Knight, “Artificial Intelligence”, McGraw-Hill
3. E Charniak and D McDermott, “Introduction to Artificial Intelligence”, Pearson Education
4. Dan W. Patterson, “Artificial Intelligence and Expert Systems”, Prentice Hall of India,

HIGH SPEED NETWORKS

NECS-071

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UNIT I 8

Frame Relay Networks – Asynchronous transfer mode–ATM Protocol Architecture ,ATM logical Connection – ATM Cell – ATM Service Categories – AAL. High Speed LAN's: Fast Ethernet – Gigabit Ethernet– Fiber Channel – Wireless LAN's, Wi-Fi and WiMax Networks applications, requirements – Architecture of 802.11.

UNIT II 8

Queuing Analysis – Queuing Models – Single Server Queues – Effects of Congestion –Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control.

UNIT III 12

TCP Flow control – TCP Congestion Control – Retransmission – Timer Management –Exponential RTO backoff – KARN's Algorithm – Window management – Performance of TCP over ATM. Traffic and Congestion control in ATM – Requirements – Attributes –Traffic Management Frame work, Traffic Control – ABR traffic Management – ABR ratecontrol, RM cell formats – ABR Capacity allocations – GFR traffic management.

UNIT IV 8

Integrated Services Architecture – Approach, Components, Services- Queuing Discipline– FQ – PS – BRFQ – GPS – WFQ – Random Early Detection – Differentiated Services.

UNIT V 8

RSVP – Goals & Characteristics, Data Flow, RSVP operations – Protocol Mechanisms– Multiprotocol Label Switching – Operations, Label Stacking – Protocol details – RTP– Protocol Architecture – Data Transfer Protocol– RTCP.

TOTAL: 44 PERIODS

Text Books:

1. William Stallings, “High speed networks and internet”, Second Edition, Pearson Education, 2002
2. Warland, Pravin Varaiya, “High performance communication networks”, Second Edition , Jean Harcourt Asia Pvt. Ltd., , 2001
3. Irvan Pepelnjk, Jim Guichard, Jeff Aparcar, “MPLS and VPN architecture”, Cisco Press, Volume 1 and 2, 2003.
4. Abhijit S. Pandya, Ercan Sea, “ATM Technology for Broad Band Telecommunication Networks”, CRC Press, New York, 2004.

ANDROID OPERATING SYSTEM

NECS-072

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UNIT I

Android OS

Android Software Stack, Activities and Applications, Activity Life Cycles, Activity Stacks, Activity States, Resources, Android OS vs. IOS

UNIT II

User Interfaces

Views, Layouts, Android Widgets, UI XML Specifications, Explicit Intents, Implicit Intents, Event Broadcasting with Intents, Event Reception with Broadcast Receivers, Adapters and Data Binding.

UNIT III

Multimedia

Audio, Video, Camera, Playing Audio and Video, Recording Audio and Video, Using the Camera to Take and Process Pictures

UNIT IV

Networking

Internet Access, HTML and XML Parsing, Wi-Fi

UNIT V

Touchscreen

Capturing Touch Events, Touchscreen Gesture Recognition

TOTAL: 44 PERIODS

Text Books:

1. Rito Meier. "Professional Android 2 Application Development." Wiley Publishing, Inc.
2. SayedHashimi, SatyaKomatineni, Dave MacLean. "Pro Android 2." APRESS.
3. Mark Murphy. "Beginning Android 2." APRESS.
4. Carmen Delessio,LaurenDarcey "Android Application Development" Pearson
5. J.F.DiMarzio "Android a programming guide" TMH

SERVICE ORIENTED ARCHITECTURE

NECS-073

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UNIT I

10

Roots of SOA – Characteristics of SOA - Comparing SOA to client-server and distributed internet architectures – Anatomy of SOA- How components in an SOA interrelate -Principles of service orientation

UNIT II

10

Web services – Service descriptions – Messaging with SOAP –Message exchange Patterns – Coordination –Atomic Transactions – Business activities – Orchestration Choreography - Service layer abstraction – Application Service Layer – Business Service Layer – Orchestration Service Layer

UNIT III

10

Service oriented analysis – Business-centric SOA – Deriving business services- service modeling - Service Oriented Design – WSDL basics – SOAP basics – SOA composition guidelines – Entity-centric business service design – Application service design – Taskcentric business service design

UNIT IV

10

SOA platform basics – SOA support in J2EE – Java API for XML-based web services (JAX-WS) - Java architecture for XML binding (JAXB) – Java API for XML Registries (JAXR) - Java API for XML based RPC (JAX-RPC)- Web Services Interoperability Technologies (WSIT) - SOA support in .NET – Common Language Runtime - ASP.NET web forms – ASP.NET web services – Web Services Enhancements (WSE).

UNIT V

5

WS-BPEL basics – WS-Coordination overview - WS-Choreography, WS-Policy, WSSecurity

TOTAL: 45 PERIODS

Text Books:

1. Thomas Erl, “Service-Oriented Architecture: Concepts, Technology, and Design”, Pearson Education, 2005.
2. Newcomer, Lomow “Understanding SOA with Web Services”, Pearson Education, 2005.
3. Sandeep Chatterjee, James Webber, “Developing Enterprise Web Services, An Architect’s Guide”, Pearson Education, 2005.
4. Dan Woods and Thomas Mattern, “Enterprise SOA Designing IT for Business Innovation” O’REILLY, First Edition, 2006
5. Kambhampaty Service Oriented Architecture for Enterprise and cloud applications , Wiley

DISTRIBUTED SYSTEMS

NECS-701

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Unit-I

Characterization of Distributed Systems: Introduction, Examples of distributed Systems, Resource sharing and the Web Challenges. Architectural models, Fundamental Models.

Theoretical Foundation for Distributed System: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport's & vectors logical clocks.

Concepts in Message Passing Systems: causal order, total order, total causal order, Techniques for Message Ordering, Causal ordering of messages, global state, termination detection.

Unit-II

10

Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms, performance metric for distributed mutual exclusion algorithms.

Distributed Deadlock Detection: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms.

Unit-III

10

Agreement Protocols: Introduction, System models, classification of Agreement Problem, Byzantine agreement problem, Consensus problem, Interactive consistency Problem, Solution to Byzantine Agreement problem, Application of Agreement problem, Atomic Commit in Distributed Database system.

Distributed Resource Management: Issues in distributed File Systems, Mechanism for building distributed file systems, Design issues in Distributed Shared Memory, Algorithm for Implementation of Distributed Shared Memory.

Unit-IV

10

Failure Recovery in Distributed Systems: Concepts in Backward and Forward recovery, Recovery in Concurrent systems, Obtaining consistent Checkpoints, Recovery in Distributed Database Systems.

Fault Tolerance: Issues in Fault Tolerance, Commit Protocols, Voting protocols, Dynamic voting protocols.

Unit -V5

Transactions and Concurrency Control: Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control.

Distributed Transactions: Flat and nested distributed transactions, Atomic Commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Replication: System model and group communication, Fault - tolerant services, highly available services, Transactions with replicated data.

TOTAL LECTURE: 45

Text Books:

1. Singhal & Shivaratri, "Advanced Concept in Operating Systems", McGraw Hill
2. Ramakrishna, Gehrke, "Database Management Systems", McGraw Hill
3. Vijay K. Garg Elements of Distributed Computing, Wiley
4. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design", Pearson Education
5. Tenanuanbaum, Steen, "Distributed Systems", PHI
6. Gerald Tel, "Distributed Algorithms", Cambridge University Press

NEURAL NETWORKS

NECS-074

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Unit-I:

Neuro Computing and Neuroscience 10

Historical notes, human Brain, neuron Model, Knowledge representation, AI and NN. Learning process: Supervised and unsupervised learning, Error correction learning, competitive learning, adaptation, statistical nature of the learning process.

Unit-II:

Data processing 10

Scaling, normalization, Transformation (FT/FFT), principal component analysis, regression, co-variance matrix, eigen values & eigen vectors. Basic Models of Artificial neurons, activation Functions, aggregation function, single neuron computation, multilayer perceptron, least mean square algorithm, gradient descent rule, nonlinearly separable problems and bench mark problems in NN.

Unit-III 10

Multilayered network architecture, back propagation algorithm, heuristics for making BP-algorithm performs better. Accelerated learning BP (like recursive least square, quick prop, RPROP algorithm), approximation properties of RBF networks and comparison with multilayer perceptron.

Unit-IV 10

Recurrent network and temporal feed-forward network, implementation with BP, self organizing map and SOM algorithm, properties of feature map and computer simulation. Principal component and Independent component analysis, application to image and signal processing.

Unit-V 5

Complex valued NN and complex valued BP, analyticity of activation function, application in 2D information processing. Complexity analysis of network models. Soft computing. Neuro-Fuzzy-genetic algorithm Integration.

TOTAL LECTURE: 45

Text Books:

1. J.A. Anderson, An Introduction to Neural Networks, MIT
2. Hagen Demuth Beale, Neural Network Design, Cengage Learning
3. Laurene V. Fausett, "Fundamentals of Neural Networks : Architectures, Algorithms and Applications", Pearson India
4. Kosko, Neural Network and Fuzzy Sets, PHI
5. Hagan, Neural Network Design w/CD, Cengage Learning

CRYPTOGRAPHY AND NETWORK SECURITY LAB

NEIT-751

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The following programs should be implemented preferably on 'UNIX' platform using 'C' language (for 1-5) and other standard utilities available with 'UNIX' systems (for 6-8) :-

1. Implement the encryption and decryption of 8-bit data using 'Simplified DES Algorithm'
2. (created by Prof. Edward Schaefer) in 'C'.
3. Implement 'Linear Congruential Algorithm' to generate 5 pseudo-random numbers in 'C'.
4. Implement Rabin-Miller Primality Testing Algorithm in 'C'.
5. Implement the Euclid Algorithm to generate the GCD of an array of 10 integers in 'C'.
6. Implement RSA algorithm for encryption and decryption in 'C'
7. Configure a mail agent to support Digital Certificates, send a mail and verify the correctness of this system using the configured parameters.
8. Configure SSH (Secure Shell) and send/receive a file on this connection to verify the correctness of this system using the configured parameters.
9. Configure a firewall to block the following for 5 minutes and verify the correctness of this system using the configured parameters:
 - (a) Two neighborhood IP addresses on your LAN
 - (b) All ICMP requests
 - (c) All TCP SYN Packets

CLOUD COMPUTING

NEOE-081

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Unit-I

Introduction to Cloud Computing

12

Cloud computing, Properties & Characteristics, Service models, Deployment models, Virtualization concepts

Unit-II

Cloud as IaaS(Infrastructure as a Service)

8

Introduction to IaaS, Private Cloud Environment, Public Cloud Environment, Managing Hybrid Cloud environment

Unit-III

Platform as a Service (PaaS)

8

Introduction to PaaS, Cloud platform & Management, Computation, Storage, Case studies

Unit-IV

Software as a Service (SaaS)

Introduction to SaaS, Web services, Web 2.0, Web OS, Case studies

Unit-V

Cloud issues and challenges

Cloud provider Lock-in, Security and Privacy issues in the Cloud, VM-Ware ESX Memory Management Capacity Planning and Disaster Recovery in Cloud Computing

TOTAL: 44 PERIODS

Text Books:

1. Kailash Jayaswal, Jagannath Kallakurchi, Donald J. Houde, Dr. Deven Shah Cloud Computing Black Book Kogent Learning
2. Dr. Kumar Saurabh, Cloud Computing, Wiley
3. Cloud Computing, Das Gupta, et al., PHI Learning
4. Cloud Computing: Concepts, Technology & Architecture (The Prentice Hall Service Technology Series from Thomas Erl) Kindle Edition
5. Cloud Computing Explained: Implementation Handbook for Enterprises 2nd ed. Edition by John Rhoton

VIRTUAL REALITY

NEOE-082

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UNIT I

INTRODUCTION:

8

History of VR technology, commercial VR technology and the five classic components of a VR system.

UNIT II

INPUT DEVICES:

12

Trackers: Three-Dimensional Position Trackers, Navigation and Manipulation Interfaces: Tracker-Based Navigation Manipulation Interfaces, Trackballs, Three-Dimensional Probes, Gesture Interfaces: The Pinch Glove, The 5DT Data, The Didjiglove.

UNIT III

OUTPUT DEVICES:

8

Graphics Displays: The Human Visual System, Personal Graphics Displays, Large-Volume Displays, Sound Displays: The Human Auditory System, the Convolvotron, Speaker-Based Three-Dimensional Sound, Haptic Displays: The Human Haptic System, Tactile Feedback Interfaces.

UNIT IV

Modeling and Programming: Geometric modeling, kinematics modeling, physical modeling, behaviour modeling, model management, Introduction to JAVA 3D.

UNIT V

8

Human Factors in VR and applications of VR: Human Factors in VR : Methodology and Terminology, , User Performance Studies, VR Health and Safety Issues, VR and Society, Applications of VR: Medical Applications, Military, Manufacturing, Robotics, Information Visualization.

TOTAL: 44 PERIODS

Text Books:

1. Gregory C. Burdea & Philippe Coiffet, Virtual Reality Technology, Second Edition John Wiley & Sons, Inc
2. Steven M. LaValle, Virtual Reality, University of Illinois
3. Philippe Fuchs, Guillaume Moreau, Pascal Guitton, Virtual Reality: Concepts and Technologies, CRC Press, 2011
4. Tony Parisi, Learning Virtual Reality, O'Reilly Media
5. Virtual Reality Systems, Vince, Pearson.

FUNDAMENTALS OF MACHINE LEARNING

NEOE-083

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Unit 1

Introduction: 8

Overview of machine learning, related areas, applications, software tools. Supervised Learning: classification and regression. Unsupervised Learning. Reinforcement Learning. Parametric regression: linear regression, polynomial regression, logistic regression, locally weighted regression, numerical optimization, gradient descent, kernel methods.

Unit 2

Generative learning: 8

Gaussian parameter estimation, maximum likelihood estimation, MAP estimation, Bayesian estimation, bias and variance of estimators, missing and noisy features, nonparametric density estimation, Gaussian discriminant analysis, naive Bayes. Discriminative learning: linear discrimination, logistic regression, logit and logistic functions, generalized linear models, softmax regression.

Unit 3

Neural networks 12

The perceptron algorithm, multilayer perceptrons, backpropagation, nonlinear regression, multiclass discrimination, training procedures, localized network structure, dimensionality reduction interpretation. Support vector machines: functional and geometric margins, optimum margin classifier, constrained optimization, Lagrange multipliers, primal/dual problems, KKT conditions, dual of the optimum margin classifier, soft margins, kernels, quadratic programming, SMO algorithm.

Unit 4

Unsupervised learning: 8

K-means clustering, expectation maximization, Gaussian mixture density estimation, mixture of naive Bayes, model selection. Graphical and sequential models: Bayesian networks, conditional independence, Markov random fields, inference in graphical models, belief propagation, Markov models, hidden Markov models, decoding states from observations, learning HMM parameters.

Unit 5

Dimensionality reduction: 8

Feature selection. Principal component analysis. Linear discriminant analysis. Factor analysis. Independent component analysis. Multidimensional scaling. Manifold learning. Reinforcement Learning: Elements of Reinforcement Learning. Markov Decision Process (MDP). Model-Based Learning/Planning algorithms. Value iteration. Policy iteration. Linear programming. Temporal Difference (TD) Learning.

TOTAL: 44 PERIODS

Text Books:

1. Machine Learning, T. Mitchell, McGraw-Hill, 1997.
2. Machine Learning in action, Peter Harrington, Wiley
3. Pattern Classification, R. Duda, E. Hart, and D. Stork, Wiley-Interscience, 2000.
4. Elements of Statistical Learning, T. Hastie, R. Tibshirani and J. Friedman, Springer, 2001.
5. Pattern Recognition and Machine Learning, C. Bishop, Springer, 2006.
6. Machine Learning, E. Alpaydin, MIT Press, 2010.
7. Machine Learning: A Probabilistic Perspective, K. Murphy, MIT Press, 2012.

MOBILE COMPUTING

NEIT-801

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Unit – I

8

Introduction, issues in mobile computing, overview of wireless telephony: cellular concept, GSM: air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS.

Unit – II

12

Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP: Architecture, protocol stack, application environment, applications.

Unit – III

8

Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system, Disconnected operations.

Unit – IV

8

Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment.

Unit – V

8

Ad-hoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks, applications.

TOTAL: 44 PERIODS

Text Books:

1. Thampi - Mobile Communications and Computing ,Wiley
2. J. Schiller, Mobile Communications, Addison Wesley.
3. Charles Perkins, Mobile IP, Addison Wesley.
4. Charles Perkins, Ad hoc Networks, Addison Wesley.
5. Upadhyaya, “Mobile Computing”, Springer
6. Stojmenovic, Handbook of Wireless Networks and Mobile Computing, Wiley India.

PATTERN RECOGNITION

NECS-080

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Unit-I

Introduction: 8

Basics of pattern recognition, Design principles of pattern recognition system, Learning and adaptation, Pattern recognition approaches, Mathematical foundations – Linear algebra, Probability Theory, Expectation, mean and covariance, Normal distribution, multivariate normal densities, Chi squared test.

Unit-II

Statistical Patten Recognition: 8

Bayesian Decision Theory, Classifiers, Normal density and discriminant functions,

Unit – III

Parameter estimation methods:12

Maximum-Likelihood estimation, Bayesian Parameter estimation, Dimension reduction methods - Principal Component Analysis (PCA), Fisher Linear discriminant analysis, Expectation-maximization (EM), Hidden Markov Models (HMM), Gaussian mixture models.

Unit - IV

Nonparametric Techniques:8

Density Estimation, Parzen Windows, K-Nearest Neighbor Estimation, Nearest Neighbor Rule, Fuzzy classification.

Unit - V

Unsupervised Learning & Clustering: 8

Criterion functions for clustering, Clustering Techniques: Iterative square - error partitional clustering – K means, agglomerative hierarchical clustering, Cluster validation.

TOTAL: 44 PERIODS

Text Books:

1. Richard O. Duda, Peter E. Hart and David G. Stork, "Pattern Classification", 2nd Edition, John Wiley, 2006.
2. C. M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2009.
3. S. Theodoridis and K. Koutroumbas, "Pattern Recognition", 4th Edition, Academic Press, 2009.
4. Pattern Recognition, Narasimha Murty, Universities Press.
5. Pattern Recognition and Image Analysis, Gose, Johnsonbaugh & Jost, PHI Learning.
6. PATTERN RECOGNITION: TECHNIQUES AND APPLICATIONS, SHINGHAL, OXFORD UNIVERSITY PRESS.

REAL TIME SYSTEM

NECS-082

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UNIT-I:

Introduction

5

Definition, Typical Real Time Applications: Digital Control, High Level Controls, Signal Processing etc., Release Times, Deadlines, and Timing Constraints, Hard Real Time Systems and Soft Real Time Systems, Reference Models for Real Time Systems: Processors and Resources, Temporal Parameters of Real Time Workload, Periodic Task Model, Precedence Constraints and Data Dependency.

UNIT-II:

Real Time Scheduling

10

Common Approaches to Real Time Scheduling: Clock Driven Approach, Weighted Round Robin Approach, Priority Driven Approach, Dynamic Versus Static Systems, Optimality of Effective-Deadline-First (EDF) and Least-Slack-Time-First (LST) Algorithms, Rate Monotonic Algorithm, Offline Versus Online Scheduling, Scheduling Aperiodic and Sporadic jobs in Priority Driven and Clock Driven Systems.

UNIT-III:

Resources Sharing

10

Effect of Resource Contention and Resource Access Control (RAC), Non-preemptive Critical Sections, Basic Priority-Inheritance and Priority-Ceiling Protocols, Stack Based Priority-Ceiling Protocol, Use of Priority-Ceiling Protocol in Dynamic Priority Systems, Preemption Ceiling Protocol, Access Control in Multiple-Unit Resources, Controlling Concurrent Accesses to Data Objects.

UNIT-IV:

Real Time Communication

10

Basic Concepts in Real time Communication, Soft and Hard RT Communication systems, Model of Real Time Communication, Priority-Based Service and Weighted Round-Robin Service Disciplines for Switched Networks, Medium Access Control Protocols for Broadcast Networks, Internet and Resource Reservation Protocols

UNIT-V:

Real Time Operating Systems and Databases

10

Features of RTOS, Time Services, UNIX as RTOS, POSIX Issues, Characteristic of Temporal data, Temporal Consistency, Concurrency Control, Overview of Commercial Real Time databases

TOTAL: 45 PERIODS

Text Books:

1. Real Time Systems by Jane W. S. Liu, Pearson Education Publication.
2. Phillip A Laplanta, Seppo J. Ovaska Real time System Design and Analysis Tools for practitioner, Wiley
3. Mall Rajib, "Real Time Systems", Pearson Education

4. Albert M. K. Cheng , “Real-Time Systems: Scheduling, Analysis, and Verification”, Wiley.
5. KRISHNA, Real-Time Systems, Mc Graw Hills

GRID COMPUTING

NECS-084

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UNIT I

CONCEPTS AND ARCHITECTURE

10

Introduction-Parallel and Distributed Computing-Cluster Computing-Grid Computing- Anatomy and Physiology of Grid-Review of Web Services-OGSA-WSRF.

UNIT II

GRID MONITORING

10

Grid Monitoring Architecture (GMA) - An Overview of Grid Monitoring Systems- GridICE – JAMM - MDS-Network Weather Service-R-GMA-Other Monitoring Systems- Ganglia and GridMon

UNIT III

GRID SECURITY AND RESOURCE MANAGEMENT

10

Grid Security-A Brief Security Primer-PKI-X509 Certificates-Grid Security-Grid Scheduling and Resource Management-Scheduling Paradigms- Working principles of Scheduling -A Review of Condor, SGE, PBS and LSF-Grid Scheduling with QoS.

UNIT IV

DATA MANAGEMENT AND GRID PORTALS

10

Data Management-Categories and Origins of Structured Data-Data Management Challenges-Architectural Approaches-Collective, Data Management Services-Federation Services-Grid Portals-First-Generation Grid Portals-Second-Generation Grid Portals.

UNIT V

GRID MIDDLEWARE

5

List of globally available Middlewares - Case Studies-Recent version of Globus Toolkit and gLite - Architecture, Components and Features

TOTAL: 45 PERIODS

Text Books:

1. JoshyJoseph, CraigFellenstein—Grid Computing, Pearson Education, 2004.
2. Vladimir Silva—Grid Computing for Developers,DreamtechPress, 2006.
3. Fran Berman, Geoffrey C. Fox, Anthony J.G Hey Grid Computing making the global infrastructure a Reality
4. AhmarAbbas--Grid Computing —A Practical Guide to Technology and Applications, Firewall Media, 2006.
5. Joshy Joseph, Craig Fellenstein, Grid Computing, Pearson Education.
6. Grid Computing Security, Anirban Chakrabarti, Springer, 2007.

Digital Image Processing

NECS-801

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UNIT-I

Introduction and Fundamentals

10

Motivation and Perspective, Applications, Components of Image Processing System, Element of Visual Perception, A Simple Image Model, Sampling and Quantization.

Image Enhancement in Frequency Domain

Fourier Transform and the Frequency Domain, Basis of Filtering in Frequency Domain, Filters – Low-pass, High-pass; Correspondence Between Filtering in Spatial and Frequency Domain; Smoothing Frequency Domain Filters – Gaussian Lowpass Filters; Sharpening Frequency Domain Filters – Gaussian Highpass Filters; Homomorphic Filtering.

UNIT-II

Image Enhancement in Spatial Domain

10

Introduction; Basic Gray Level Functions – Piecewise-Linear Transformation Functions: Contrast Stretching; Histogram Specification; Histogram Equalization; Local Enhancement; Enhancement using Arithmetic/Logic Operations – Image Subtraction, Image Averaging; Basics of Spatial Filtering; Smoothing - Mean filter, Ordered Statistic Filter; Sharpening – The Laplacian.

UNIT-III

Image Restoration

10

A Model of Restoration Process, Noise Models, Restoration in the presence of Noise only-Spatial Filtering – Mean Filters: Arithmetic Mean filter, Geometric Mean Filter, Order Statistic Filters – Median Filter, Max and Min filters; Periodic Noise Reduction by Frequency Domain Filtering – Bandpass Filters; Minimum Mean-square Error Restoration.

UNIT-IV

Morphological Image Processing

10

Introduction, Logic Operations involving Binary Images, Dilation and Erosion, Opening and Closing, Morphological Algorithms – Boundary Extraction, Region Filling, Extraction of Connected Components, Convex Hull, Thinning, Thickening

UNIT-V Registration

5

Introduction, Geometric Transformation – Plane to Plane transformation, Mapping, Stereo Imaging – Algorithms to Establish Correspondence, Algorithms to Recover Depth

Segmentation

Introduction, Region Extraction, Pixel-Based Approach, Multi-level Thresholding, Local Thresholding, Region-based Approach, Edge and Line Detection: Edge Detection, Edge Operators, Pattern Fitting Approach, Edge Linking and Edge Following, Edge Elements Extraction by Thresholding, Edge Detector Performance, Line Detection, Corner Detection.

TOTAL: 45 PERIODS

Text Books:

1. Digital Image Processing 2nd Edition, Rafael C. Gonzalvez and Richard E. Woods. Published by: Pearson Education.
2. Digital Image Processing and Computer Vision, R.J. Schalkoff. Published by: John Wiley and Sons, NY.
3. Fundamentals of Digital Image Processing, A.K. Jain. Published by Prentice Hall, Upper Saddle
4. Sonka, Digital Image Processing and Computer Vision, Cengage Learning
5. Gonzalez and Woods, Digital Image Processing, Addison Wesley.

NEIT-802 Natural Language Processing

NEIT-082

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Unit-I

Introduction to Natural Language Understanding: The study of Language, Applications of NLP, Evaluating Language Understanding Systems, Different levels of Language Analysis, Representations and Understanding, Organization of Natural language Understanding Systems, Linguistic Background: An outline of English syntax.

Unit-II

Introduction to semantics and knowledge representation, Some applications like machine translation, database interface.

Unit-III

Grammars and Parsing: Grammars and sentence Structure, Top-Down and Bottom-Up Parsers, Transition Network Grammars, Top-Down Chart Parsing. Feature Systems and Augmented Grammars: Basic Feature system for English, Morphological Analysis and the Lexicon, Parsing with Features, Augmented Transition Networks.

Unit-IV

Grammars for Natural Language: Auxiliary Verbs and Verb Phrases, Movement Phenomenon in Language, Handling questions in Context-Free Grammars. Human preferences in Parsing, Encoding uncertainty, Deterministic Parser.

Unit-V

Ambiguity Resolution: Statistical Methods, Probabilistic Language Processing, Estimating Probabilities, Part-of-Speech tagging, Obtaining Lexical Probabilities, Probabilistic Context-Free Grammars, Best First Parsing. Semantics and Logical Form, Word senses and Ambiguity, Encoding Ambiguity in Logical Form.

References:

1. Akshar Bharti, Vineet Chaitanya and Rajeev Sangal, NLP: A Paninian Perspective, Prentice Hall, New Delhi
2. James Allen, Natural Language Understanding, Pearson Education
3. D. Jurafsky, J. H. Martin, Speech and Language Processing, Pearson Education
4. L.M. Iivansca, S. C. Shapiro, Natural Language Processing and Language Representation
5. T. Winograd, Language as a Cognitive Process, Addison-Wesley

DATA COMPRESSION

NECS-085

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Unit - I:

10

Compression Techniques: Loss less compression, Lossy Compression, Measures of performance, Modeling and coding, Mathematical Preliminaries for Lossless compression: A brief introduction to information theory, Models: Physical models, Probability models, Markov models, composite source model, Coding: uniquely decodable codes, Prefix codes.

Unit – II:

10

The Huffman coding algorithm: Minimum variance Huffman codes, Adaptive Huffman coding: Update procedure, Encoding procedure, Decoding procedure. Golomb codes, Rice codes, Tunstall codes, Applications of Hoffman coding: Loss less image compression, Text compression, Audio Compression.

Unit-III:

10

Coding a sequence, Generating a binary code, Comparison of Binary and Huffman coding, Applications: Bi-level image compression-The JBIG standard, JBIG2, Image compression. Dictionary Techniques: Introduction, Static Dictionary: Diagram Coding, Adaptive Dictionary. The LZ77 Approach, The LZ78 Approach, Applications: File Compression-UNIX compress, Image Compression: The Graphics Interchange Format (GIF), Compression over Modems: V.42 bits, Predictive Coding: Prediction with Partial match (ppm): The basic algorithm, The ESCAPE SYMBOL, length of context, The Exclusion Principle, The Burrows-Wheeler Transform: Move-to-front coding, CALIC, JPEG-LS, Multi-resolution Approaches, Facsimile Encoding, Dynamic Markov Compression.

Unit – IV:

10

Distortion criteria, Models, Scalar Quantization: The Quantization problem, Uniform Quantizer, Adaptive Quantization, Non uniform Quantization.

Unit-V:

5

Advantages of Vector Quantization over Scalar Quantization, The Linde-Buzo-Gray Algorithm, Tree structured Vector Quantizers. Structured VectorQuantizers.

TOTAL: 45 PERIODS

Text Books:

1. Khalid Sayood, Introduction to Data Compression, Morgan Kaufmann Publishers
2. Elements of Data Compression, Drozdek, Cengage Learning
3. Introduction to Data Compression, Second Edition, Khalid Sayood, The Morgan Kaufmann Series
4. Data Compression: The Complete Reference 4th Edition by David Salomon, Springer
5. Text Compression 1st Edition by Timothy C. Bell Prentice Hall.

EMBEDDED SYSTEMS

NECS-087

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Unit-I **10**

Introduction to embedded systems: Classification, Characteristics and requirements, Applications

Unit-II **10**

Timing and clocks in Embedded systems, Task Modeling and management, Real time operating system issues.

Unit-III **10**

Signals, frequency spectrum and sampling, digitization (ADC, DAC), Signal Conditioning and Processing. Modeling and Characterization of Embedded Computation System.

Unit-IV **10**

Embedded Control and Control Hierarchy, Communication strategies for embedded systems: Encoding and Flow control.

Unit-V **5**

Fault-Tolerance, Formal Verification, Trends in Embedded Processor, OS, Development Language

References:

1. Prasad, Embedded /Real Time System, Concept, Design and Programming Black Book, Wiley India
2. H.Kopetz, "Real-Time Systems", Kluwer
3. R.Gupta, "Co-synthesis of Hardware and Software for Embedded Systems", Kluwer
4. Shibu K.V., "Introduction to Embedded Systems", TMH
5. Marwedel, "Embedded System Design", Springer

SEMANTIC WEB AND WEB SERVICES

NECS-088

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UNIT I **12**

Introduction to Semantic Web: History of Semantic Web, goals and vision, problems, Semantic Web Technologies, Layered Approach, Syntactic vs semantic web, Applications of semantic web.

UNIT II **8**

Architecture: XML with Document Type Definitions and Schema, addressing and querying XML documents, RDF (Resource Description Framework), basic idea and syntax, querying in RQL, URI (8 Hrs.)

UNIT III **8**

Ontologies: Role of Ontology in intelligent information retrieval on web, OWL, Ontologies for different applications. Ontology engineering: constructing ontologies manually, reusing existing ontologies.

UNIT IV **8**

Semantics: Kinds of semantics, use of semantics, Search Engines: Role of search Engines in intelligent retrieval of information on web, Semantic web browsers.

UNIT V **8**

Logic and inference: examples of Monotonic rules: family relationships, monotonic rules: syntax and semantics, Non-monotonic rules: Motivation and syntax, Non-monotonic rule example: and Brokered Trade, Rule Mark-up XML: Monotonic and Non-Monotonic rules.(8 Hrs.)

References:-

1. Salam, A. F., ed. SemanticWeb Technologies and E-Business: Toward the Integrated Virtual Organization and Business Process Automation:. IGI Global, 2006.
2. Cardoso, Jorge, ed. Semantic Web Services: Theory, Tools and Applications: Theory, Tools and Applications. IGI Global, 2007.
3. Antoniou, Grigoris, and Frank Van Harmelen. A semantic web primer. MIT press, 2004.
4. Pascal Hitzler, Markus Krotzsch, Sebastian Rudolph, Foundations of Semantic Web Technologies, CRC Press
5. Daconta, Michael C., Leo J. Obrst, and Kevin T. Smith. The semantic web: a guide to the future of XML, web services, and knowledge management. John Wiley & Sons, 2003.

SOFTWARE QUALITY ENGINEERING

NEIT-803 **L T P**
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UNIT-I: **8**
Introduction

Defining Software Quality, Software Quality Attributes and Specification, Cost of Quality, Defects, Faults, Failures, Defect Rate and Reliability, Defect Prevention, Reduction, and Containment, Overview of Different Types of Software Review, Introduction to Measurement and Inspection Process, Documents and Metrics.

UNIT-II: **8**
Software Quality Metrics

Product Quality Metrics: Defect Density, Customer Problems Metric, Customer Satisfaction Metrics, Function Points, In-Process Quality Metrics: Defect Arrival Pattern, Phase-Based Defect Removal Pattern, Defect Removal Effectiveness, Metrics for Software Maintenance: Backlog Management Index, Fix Response Time, Fix Quality, Software Quality Indicators.

UNIT-III: **8**
Software Quality Management and Models

Modeling Process, Software Reliability Models: The Rayleigh Model, Exponential Distribution and Software Reliability Growth Models, Software Reliability Allocation Models, Criteria for Model Evaluation, Software Quality Assessment Models: Hierarchical Model of Software Quality Assessment.

UNIT-IV: **12**
Software Quality Assurance

Quality Planning and Control, Quality Improvement Process, Evolution of Software Quality Assurance (SQA), Major SQA Activities, Major SQA Issues, Zero Defect Software, SQA Techniques, Statistical Quality Assurance, Total Quality Management, Quality Standards and Processes.

UNIT-V:

Software Verification, Validation & Testing: 8

Verification and Validation, Evolutionary Nature of Verification and Validation, Impracticality of Testing all Data and Paths, Proof of Correctness, Software Testing, Functional, Structural and Error-Oriented Analysis & Testing, Static and Dynamic Testing Tools, Characteristics of Modern Testing Tools.

TOTAL: 44 PERIODS

Text Books

1. Jeff Tian, Software Quality Engineering (SQE), Wiley
2. Stephen H. Kan, Metrics and Models in Software Quality Engineering, Addison-Wesley
3. M. Cotterell, Software Project Management, Tata McGraw-Hill Publication.
4. Royce, Software Project Management, Pearson Education
5. Kieron Conway, Software Project Management, Dreamtech Press
6. S. A. Kelkar, Software Project Management, PHI Publication.

SOFTWARE RELIABILITY

NEIT-804

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UNIT-I:

Introduction 8

Defining Software Reliability, Software Reliability Attributes and Specification, Concept of Defects, Faults, Failures, Defect Rate and Reliability, Defect Prevention, Reduction, and Containment, Overview of Different Types of Software Review, Introduction to Measurement and Inspection Process, Documents and Metrics.

UNIT-II:

Software Reliability Metrics 8

Collection of fault and failure data, Measurement of internal and external product attributes, Customer Problems Metric, Customer Satisfaction Metrics, In-Process Quality Metrics: Defect Arrival Pattern, Phase-Based Defect Removal Pattern, Defect Removal Effectiveness, Metrics for Software Maintenance, Software Reliability indicators, Software Reliability Metrics, Static Code Metrics, Dynamic Metrics.

UNIT-III:

Software Reliability Assessment Models 8

Basics of Reliability Theory, Software Reliability Problem, Modeling Process, Software Reliability Models, Parametric Reliability Growth Models, The Rayleigh Model, Exponential Distribution and Software Reliability Growth Models, Software Quality Assessment Models: Hierarchical Model of Software Quality Assessment.

UNIT-IV:

Software Reliability Allocation Models 8

Software Reliability Allocation Models, Criteria for Model Evaluation, Optimal Reliability Allocation, Quality Planning and Control, Quality Improvement Process, Evolution of Software Quality Assurance (SQA), Major SQA Activities, Major SQA Issues, Zero Defect Software.

UNIT-V:

Software Reliability Techniques

12

Reliability Techniques: Trending Reliability Techniques, Predicting Reliability Techniques, Error Seeding, Failure Rate, Curve Fitting, Reliability Growth, Models and Tools: Study of tools like CASRE, SARA, SMERFS.

TOTAL: 44 PERIODS

Text Books

1. John Musa, "Software Reliability Engineering", McGraw-Hill
2. Fenton, and Pfleeger, "Software Metrics: A Rigorous and Practical Approach", International Thomson Computer Press
3. Jeff Tian, Software Quality Engineering (SQE), Wiley
4. Stephen H. Kan, Metrics and Models in Software Quality Engineering, Addison-Wesley