Dr.A.P.J.Abdulkalam Technical University, UttarPardesh,Lucknow  
(Formerly Uttar Pradesh Technical University)  
STUDY EVALUATION SCHEME  
B. TECH. COMPUTER SCIENCE & ENGINEERING  
YEAR forth, SEMESTER –VII  
(Effective from the session: 2016-17)

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Period</th>
<th>Evaluation Scheme</th>
<th>Total Credit</th>
</tr>
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<td>1</td>
<td>NCS-701</td>
<td>Distributed System</td>
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<td>3</td>
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<td>Practical / Training /Projects</td>
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<td>Distributed System *</td>
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<td>General Proficiency</td>
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<td>Total</td>
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</table>

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.
### STUDY EVALUATION SCHEME

**B. TECH. COMPUTER SCIENCE & ENGINEERING**  
YEAR forth, SEMESTER –VIII  
(Effective from the session: 2016-17)

<table>
<thead>
<tr>
<th>SNo</th>
<th>Subject Code</th>
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<th>Credit</th>
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<td>12-4-15</td>
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</tbody>
</table>

*Practical's / Training /Projects*
Open Elective I

1. NOE-071 Entrepreneurship Development
2. NOE-072 Quality Management
3. NOE-073 Operations Research
4. NOE-074 Introduction to Bio Technology
5. NOE-075 Mobile Application Development
6. NOE-076 Ethical Hacking and Prevention
7. NOE-077 Software Project Management

Open Elective II

1. NOE-081 Non Conventional Energy Resources
2. NOE-082 Non Linear Dynamics Systems
3. NOE-083 Product Development
4. NOE-084 Automation and Robotics

Departmental Elective III

1. NCS-071 Software Testing and Audit
2. NCS-072 Neural Network
3. NCS-073 Computer Vision

Departmental Elective IV

1. NCS-074 High Speed Network
2. NCS-075 Android Operating System
3. NCS-076 Service Oriented Architecture
4. NIT-701 Cryptographic & Network Security

Departmental Elective V

1. NCS-080 Pattern Recognition
2. NCS-081 High Performance Computing
3. NCS-082 Real Time System
4. NCS-083 Cluster Computing
5. NCS-084 Grid Computing

Departmental Elective VI

1. NCS-085 Data Compression
2. NCS-086 Quantum Computing
3. NCS-087 Embedded Systems
4. NCS-088 Semantic Web and Web Services
ENTREPRENEURSHIP DEVELOPMENT

NOE-071

UNIT -I
Entrepreneurship- definition. growth of small scale industries in developing countries and their positions vis-a-vis large industries; role of small scale industries in the national economy; characteristics and types of small scale industries; demand based and resources based ancillaries and sub-control types. 5
Government policy for small scale industry; stages in starting a small scale industry. 2

UNIT -II
Project identification- assessment of viability, formulation, evaluation, financing, field-study and collection of information, preparation of project report, demand analysis, material balance and output methods, benefit cost analysis, discounted cash flow, internal rate of return and net present value methods. 8

UNIT -III
Accountancy- Preparation of balance sheets and assessment of economic viability, decision making, expected costs, planning and production control, quality control, marketing, industrial relations, sales and purchases, advertisement, wages and incentive, inventory control, preparation of financial reports, accounts and stores studies. 9

UNIT -IV
Project Planning and control:
The financial functions, cost of capital approach in project planning and control. Economic evaluation, risk analysis, capital expenditures, policies and practices in public enterprises. profit planning and programming, planning cash flow, capital expenditure and operations. control of financial flows, control and communication. 9

UNIT -V
Laws concerning entrepreneur viz, partnership laws, business ownership, sales and income taxes and workman compensation act. 5
Role of various national and state agencies which render assistance to small scale industries. 2

Text / Reference Books:
QUALITY MANAGEMENT

NOE-072

UNIT-I
Quality Concepts:
Evolution of Quality Control, concept change, TQM Modern concept, Quality concept in design,
Review of design, Evolution of proto type. 3
Control on Purchased Product
Procurement of various products, evaluation of supplies, capacity verification, Development of
sources, procurement procedure. 2
Manufacturing Quality
Methods and techniques for manufacture, inspection and control of product, quality in sales
and
services, guarantee, analysis of claims. 5
UNIT-II
Quality Management
Organization structure and design, quality function, decentralization, designing and fitting,
organization for different type products and company, economics of quality value and
contribution, quality cost, optimizing quality cost, seduction program. 3
Human Factor in quality
Attitude of top management, cooperation of groups, operators attitude, responsibility, causes
of
apparatus error and corrective methods. 2
UNIT-III Control
Charts
Theory of control charts, measurement range, construction and analysis of R charts, process
capability study, use of control charts. 5
Attributes of Control Chart
Defects, construction and analysis of charts, improvement by control chart, variable sample size,
construction and analysis of C charts. 5
UNIT -IV
Defects diagnosis and prevention defect study, identification and analysis of defects, correcting
measure, factors affecting reliability, MTTF, calculation of reliability, building reliability in the
product, evaluation of reliability, interpretation of test results, reliability control,
maintainability,
zero defects, quality circle. 8
UNIT –V
ISO-9000 and its concept of Quality Management
7
ISO 9000 series, Taguchi method, JIT in some details.
Text / Reference Books:
UNIT-I
Introduction:
Definition and scope of operations research (OR), OR model, solving the OR model, art of modeling, phases of OR study.
Linear Programming:
Two variable Linear Programming model and Graphical method of solution, Simplex method, Dual Simplex method, special cases of Linear Programming, duality, sensitivity analysis.
UNIT-II
Transportation Problems:
Types of transportation problems, mathematical models, transportation algorithms, Assignment:
Allocation and assignment problems and models, processing of job through machines.
UNIT-III
Network Techniques:
Shortest path model, minimum spanning Tree Problem, Max-Flow problem and Min-cost problem.
Project Management:
Phases of project management, guidelines for network construction, CPM and PERT.
UNIT-IV
Theory of Games:
Rectangular games, Minimax theorem, graphical solution of 2 x n or m x 2 games, game with mixed strategies, reduction to linear programming model.
Quality Systems:
Elements of Queuing model, generalized poisson queuing model, single server models.
UNIT-V
Inventory Control:
Models of inventory, operation of inventory system, quantity discount.
Replacement:
Replacement models: Equipment’s that deteriorate with time, equipment’s that fail with time.

Text / Reference Books:
INTRODUCTION TO BIOTECHNOLOGY

NOE-074 L T P 3 1 0

UNIT-I
Introduction: Concept nature and scope of biotechnology.
Cell Structure and Function: Eukaryotic and prokaryotic cells, cell wall, membrane organization, cell organelles, Nucleus, Mitochondria, endoplasmic reticulum, chloroplast, viruses and toxins into cells.
Cell Division: Mitosis and Meiosis.

UNIT-II
Biomolecules: A brief account of structure of carbohydrates, Lipids and Proteins.
Genes: Brief idea about Mendel’s laws and chromosomes, nature of genetic materials, DNA and RNA, DNA replication.

UNIT-III
Gene Expression: Central dogma, genetic code, molecular mechanism on mutations, regulations of gene expression, house keeping genes, differentiation and development mutations and their molecular basic.
Genetic Engineering: Introduction, cloning (vectors and enzymes), DNA and genomic libraries, Transgenics, DNA fingerprinting, genomics.

UNIT-IV
Applications of Biotechnology: Bioprocess and fermentation technology, cell culture, Enzyme technology, biological fuel generation, sewage treatment, environmental biotechnology, biotechnology and medicine, biotechnology in agriculture, food and beverage technology, production of biological invention.

UNIT-V
Safety and Ethics: Safety, social, moral and ethic considerations, environmental ethics, bioethics and stem cell research, safety of new biotechnology foods, agro biodiversity and donor policies.

Text Books/ Reference Books:
2. P.K. Gupta, “Elements of Biotechnology” Rastogi
MOBILE APPLICATION DEVELOPMENT

UNIT I

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


UNIT III

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


UNIT V


TOTAL LECTURE: 45

REFERENCES:
2. AnubhavPradhan, Anil V Despande Composing Mobile Apps, Learn, explore, apply
ETHICAL HACKING AND PREVENTION

NOE-076

Unit-I 10
Ethical Hacking: Introduction, Networking & Basics, Foot Printing, Google Hacking, Scanning, Windows Hacking, Linux Hacking, Trojans & Backdoors, Virus & Worms,

Unit-II 10
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-IV 15
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

REFERENCES:
SOFTWARE PROJECT MANAGEMENT

NOE-077

UNIT-I:
Introduction and Software Project Planning


UNIT-II:
Project Organization and Scheduling


UNIT-III:
Project Monitoring and Control


UNIT-IV:
Software Quality Assurance and Testing


UNIT-V:
Project Management and Project Management Tools


TOTAL LECTURE: 45
REFERENCES:
2. Royce, Software Project Management, Pearson Education

DISTRIBUTED SYSTEMS

NCS-701                                                                                                                           L     T      P
Unit–I                                                                                                                                        10
Theoretical Foundation for Distributed System: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks ,Lamport’s& vectors logical clocks.

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

Unit–IV                                                                                                                                    10

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

REFERENCES:

3. Vijay K.Garg Element of Distributed Computing, Wiley
5. Tenanuanbaum, Steen,” Distributed Systems”, PHI

ARTIFICIAL INTELLIGENCE

NCS-702

<table>
<thead>
<tr>
<th>Unit</th>
<th>L</th>
<th>T</th>
<th>P</th>
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<tbody>
<tr>
<td>Unit-I</td>
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<tr>
<td>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 Possessing.</td>
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<tr>
<td>Unit-II</td>
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<tr>
<td>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.</td>
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<tr>
<td>Unit-III</td>
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<tr>
<td>Knowledge Representation &amp; Reasoning: Propositional logic, Theory of first order logic, Inference in First order logic, Forward &amp; Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks.</td>
<td>10</td>
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<tr>
<td>Unit-IV</td>
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<tr>
<td>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,</td>
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<tr>
<td>Unit-V</td>
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<tr>
<td>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.</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TOTAL LECTURE: 45

REFERENCES:

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,
SOFTWARE TESTING AND AUDIT

NCS-071

Unit-I

Review of Software Engineering:

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:
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, CyclomaticComplexity, Data Flow Testing, Mutation Testing.

Unit-III

Regression Testing:
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:

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

Automated Test Data Generation:

Unit-V:

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


TOTAL LECTURE: 45

REFERENCES:
## NEURAL NETWORKS

<table>
<thead>
<tr>
<th>Unit</th>
<th>L</th>
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<tbody>
<tr>
<td><strong>Unit-I:</strong> Neuro Computing and Neuroscience</td>
<td>3</td>
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<tr>
<td>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.</td>
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<tr>
<th>Unit-II: Data processing</th>
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</thead>
<tbody>
<tr>
<td>Scaling, normalization, Transformation (FT/FFT), principal component analysis, regression, co-variance matrix, eigen values &amp; 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 benchmark problems in NN.</td>
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| Unit-III 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 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. |


**TOTAL LECTURE: 45**

**REFERENCES:**
1. J.A. Anderson, An Introduction to Neural Networks, MIT
2. Hagen Demuth Beale, Neural Network Design, Cengage Learning
4. Kosko, Neural Network and Fuzzy Sets, PHI
5. Hagan, Neural Network Design w/CD, Cengage Learning
UNIT 1
IMAGE FORMATION MODEL
Monocular Imaging System, Orthographic & Perspective Projection, Camera model and Camera calibration, Binocular imaging systems

UNIT 2
IMAGE PROCESSING AND FEATURE EXTRACTION
Image representations (continuous and discrete), Edge detection

UNIT 3
MOTION ESTIMATION
Regularization Theory, Optical Computation, Stereo Vision, Motion Estimation, Structure from Motion

UNIT 4
SHAPE REPRESENTATION AND SEGMENTATION
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
Hough transforms and other simple object recognition Methods, Shape Correspondence and Shape Matching, Principal component analysis, Shape priors for recognition

TOTAL LECTURE: 45

REFERENCES:

HIGH SPEED NETWORKS

NCS-074

UNIT I 8
Frame Relay Networks – Asynchronous transfer mode–ATM Protocol Architecture, ATM logical
Ethernet– Fiber Channel – Wireless LAN’s, WiFi 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 rate control, RM cell formats – ABR Capacity allocations –
GFR traffic management.

UNIT IV 8
Integrated Services Architecture – Approach, Components, Services- Queuing Discipline – FQ – PS –

UNIT V 8
Transfer Protocol – RTCP.

TOTAL: 44 PERIODS

REFERENCES:
Harcourt Asia Pvt. Ltd., 2001
3. Irvan Pepelnijk, Jim Guichard, Jeff Apcar, “MPLS and VPN architecture”, Cisco Press, Volume 1
4. Abhijit S. Pandya, Ercan Sea, “ATM Technology for Broad Band Telecommunication Networks”,
CRC Press, New York, 2004
ANDROID OPERATING SYSTEM

NCS-075

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

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

REFERENCES:
2. SayedHashimi, SatyaKomatineni, Dave MacLean. "Pro Android 2." APRESS.
5. J.F.DiMarzio “Android a programming guide” TMH
SERVICE ORIENTED ARCHITECTURE

NCS-076  L    T    P
          3    1    0

UNIT I  10

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

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

REFERENCES:
5. Kambhampaty Service Oriented Architecture for Enterprise and cloud applications , Wiley
CRYPTOGRAPHY & NETWORK SECURITY

NIT-701

Unit-I
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, fiestal structure, Data encryption standard (DES), Strength of DES, Idea of differential cryptanalysis, block cipher modes of operations, Triple DES

Unit-II
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
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
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
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

REFERENCES:
DISTRIBUTED SYSTEM LAB

NCS-751

L  T  P
0  0  2

The following programs may be developed preferably on ‘UNIX’ platform:- A part from the above other problems may be given as per Course Instructor.

1. Simulate the functioning of Lamport’s Logical Clock in ‘C’.
2. Simulate the Distributed Mutual Exclusion in ‘C’.
3. Implement a Distributed Chat Server using TCP Sockets in ‘C’.
4. Implement RPC mechanism for a file transfer across a network in ‘C’
5. Implement ‘Java RMI’ mechanism for accessing methods of remote systems.
7. Implement CORBA mechanism by using ‘C++’ program at one end and ‘Java program on the other.’
NON-CONVENTIONAL ENERGY RESOURCES

NOE-081 L T P
UNIT-I
Introduction
Various non-conventional energy resources- Introduction, availability, classification, relative merits and demerits. 3
Solar Cells:
Theory of solar cells. solar cell materials, solar cell array, solar cell power plant, limitations. 4
UNIT-II
Solar Thermal Energy:
Solar radiation, flat plate collectors and their materials, applications and performance, focussing of collectors and their materials, applications and performance; solar thermal power plants, thermal energy storage for solar heating and cooling, limitations. 9
UNIT-III Geothermal
Energy:
Resources of geothermal energy, thermodynamics of geo-thermal energy conversion-electrical conversion, non-electrical conversion, environmental considerations. 4
Magneto-hydrodynamics (MHD):
Principle of working of MHD Power plant, performance and limitations. 2
Fuel Cells:
Principle of working of various types of fuel cells and their working, performance and limitations. 3
UNIT-IV
Thermo-electrical and thermionic Conversions:
Principle of working, performance and limitations. 2
Wind Energy:
Wind power and its sources, site selection, criterion, momentum theory, classification of rotors, concentrations and augments, wind characteristics. performance and limitations of energy conversion systems. 6
UNIT-V
Bio-mass:
Availability of bio-mass and its conversion theory. 2
Ocean Thermal Energy Conversion (OTEC):
Availability, theory and working principle, performance and limitations.
Wave and Tidal Wave:
Principle of working, performance and limitations.
Waste Recycling Plants. 3
Text/References Books:
NON-LINEAR DYNAMIC SYSTEMS

NOE-082

UNIT-I
Dynamic systems:
Concept of dynamic systems, importance of non-linearity, nonlinear dynamics of flows (in 1, 2, and 3 dimensions) and Maps (1 and 2 dimensions) in phase space, Equilibrium, Periodicity.
Picard’s theorem, Peano’s theorem, boundedness of solutions, omega limit points of bounded trajectories. 8

UNIT-II
STABILITY-I:
Stability via Lyapunov’s indirect method, converse Lyapunov functions, sublevel sets of Lyapunov functions, Lasalle’s invariance principle. 7

UNIT-III
Stability-II
Lyapunov’s direct method, converse Lyapunov’s theorems, Brokett’s theorem, applications to control system, stable manifold theorem, centre manifold theorem, normal form theory and applications to nonlinear systems. 8

UNIT-IV
Bifurcation:
Elementary Bifurcation theory, catastrophe, strange attractor, fractals, fractal geometry and fractal dimension. 8

UNIT-V
Chaos:
Deterministic Chaos, routes to chaos (period doubling, quasiperiodicity, intermittency, universality, renormalization); Measurement of Chaos (Poincare section, Lyapunov index, entropy); control of chaos. 9

Reference Books:
PRODUCT DEVELOPMENT

NOE- 083 NOE- 083 NOE- 083
UNIT- I
Concept of Product, definition and scope.
Design definitions, old and new design methods, design by evolution, examples such as
evolution of sewing M/C, bicycle, safety razor etc., need based developments, technology based
developments physical reliability & economic feasibility of design concepts.

UNIT –II
Murphology of design, divergent, transformation and convergent phases of product design,
identification of need, Analysis of need. Design criteria; functional, aesthetics, ergonomics,
form, shape, size, colour.
Mental blocks, Removal blocs, Ideation techniques, Creativity, Check list.

UNIT –III
Transformations, Brainstorming & Synetics, Morephological techniques.
Utility Concept, Utility Valaue, Utility Index, Decision making under Multiple Criteria.
Economic aspects, Fixed and variable costs, Break-even analysis.

UNIT-IV
Reliability considerations, Bath tub curve, Reliability of systems in series and parallel, Failure
rate, MTTF and MTBF, Optimum spares from Reliability considerations.
Design of display and controls, Man- machine interface, Compatibility of displays and
controls. Ergonomic aspects, Anthroprometric data and its importance in design.
Application of Computers in Product development & design.

UNIT-V
Existing techniques, such as work-study, SQC etc. for improving method & quality of product.
Innovation versus Invention. Technological Forecasting.
Use of Standards for Design.

Text/Reference Books:
1. Introduction: Definition, Classification of Robots, geometric classification and control classification.
2. Robot Elements: Drive system, control system, sensors, end effectors, gripper actuators and gripper design.
3. Robot Coordinate Systems and Manipulator Kinematics: Robot co-ordinate system representation, transformation, homogenous transform and its inverse, relating the robot to its world.
Manipulators Kinematics, parameters of links and joints, kinematic chains, dynamics of kinematic chains, trajectory planning and control, advanced techniques of kinematics and dynamics of mechanical systems, parallel actuated and closed loop manipulators.
4. Robot Control: Fundamental principles, classification, position, path velocity and force control systems, computed torque control, adaptive control, Serro system for robot control, and introduction to robot vision.
5. Robot Programming: Level of robot programming, language based programming, task level programming, robot programming synthesis, robot programming for welding, machine tools, material handing, assembly operations, collision free motion planning.
6. Applications: Application of robot in welding, machine tools, material handling, assembly operations parts sorting and parts inspection.
Text/Reference Books:
2. Y. Koren “Robotics for Engineers” Mcgraw Hill.
6. Asfahl, “Robots & Manufacturing Automat
Digital Image Processing

UNIT-I
Introduction and Fundamentals

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
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
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

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

Segmentation

TOTAL: 45 PERIODS

REFERENCES:
PATTERN RECOGNITION

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 Pattern 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
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

REFERENCES:

B. TECH. COMPUTER SCIENCE & ENGINEERING YEAR forth
HIGH PERFORMANCE COMPUTING

NCS-081

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V

TOTAL: 45 PERIODS

REFERENCES:
1. Laurence T. Yang, Minyi Guo – High Performance Computing Paradigm and Infrastructure John Wiley
REAL TIME SYSTEM

UNIT-I:
Introduction 5
Definition, Typical Real Time Applications: Digital Control, High Level Controls, Signal Processing etc.,
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

REFERENCES:
2. Phillip A Laplanta, Seppo J. Ovaska Real time System Design and Analysis Tools for practitioner, Wiley
UNIT I:
Basic concepts in Distributed Systems
Notion of time Distributed Mutual exclusion, Consensus, Failure models Paradigms for process interaction in distributed programs, Programming Paradigms, Shared memory, Message passing, Workflows

UNIT II:

UNIT III:
Cluster Technology for High Availability, Performance Models and Simulation, Process Scheduling, Load Sharing and Load Balancing, Distributed Shared Memory,

UNIT IV:
Introduction to Grid Architecture, Characterization of Grid, and Grid related standard bodies, Grid types, Topologies, Components and Layers, Comparison with other approaches.

UNIT V:
System Infrastructure, Traditional paradigms for distributed computing, Web Services, Grid standards: OGSA and WSRF, Case Studies of Cluster Systems: Beowulf, COMPaS, NanOS and PARAM

TOTAL: 45 PERIODS

REFERENCES:
2. A networking Approach To Grid Computing by Daniel Minoli (Chapter 1) (John Wiley and Sons, INC Publication)
4. Fran Berman, Geoffrey C. Fox, Anthony J.G Hey Grid Computing making the global infrastructure a Reality
6. In search of clusters (2nd ed.), Gregory F. Pfister, IBM, Austin, TX, Prentice-Hall
GRID COMPUTING

NCS-084

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

UNIT IV
DATA MANAGEMENT AND GRID PORTALS 10

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

REFERENCES:
3. Fran Berman, Geofffrey C. Fox, Anthony J.G Hey Grid Computing making the global infrastructure a Reality, Wiley
DATA COMPRESSION

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Unit - I: 10

Unit – II: 10

Unit-III: 10

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 Vector Quantizers.

TOTAL: 45 PERIODS

REFERENCES:
1. Khalid Sayood, Introduction to Data Compression, Morgan Kaufmann Publishers
2. Elements of Data Compression,Drozdek, Cengage Learning
5. Text Compression1st Edition by Timothy C. Bell Prentice Hall
QUANTUM COMPUTING

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UNIT I  10
FUNDAMENTAL CONCEPTS
Global Perspectives, Quantum Bits, Quantum Computation, Quantum Algorithms, Quantum Information,
Postulates of Quantum Mechanisms.

UNIT II QUANTUM COMPUTATION  10
Quantum Circuits – Quantum algorithms, Single Orbit operations, Control Operations, Measurement,
Universal Quantum Gates, Simulation of Quantum Systems, Quantum Fourier transform, Phase
estimation, Applications, Quantum search algorithms – Quantum counting – Speeding up the solution of
NP – complete problems – Quantum Search for an unstructured database.

UNIT III QUANTUM COMPUTERS 10
Guiding Principles, Conditions for Quantum Computation, Harmonic Oscillator Quantum Computer,
Optical Photon Quantum Computer – Optical cavity Quantum electrodynamics, Ion traps, Nuclear
Magnetic resonance.

UNIT IV QUANTUM INFORMATIONS  10
Quantum noise and Quantum Operations – Classical Noise and Markov Processes, Quantum Operations,
Examples of Quantum noise and Quantum Operations – Applications of Quantum operations, Limitations
of the Quantum operations formalism, Distance Measures for Quantum information.

UNIT V QUANTUM ERROR CORRECTION  5
Introduction, Shor code, Theory of Quantum Error –Correction, Constructing Quantum Codes, Stabilizer
codes, Fault – Tolerant Quantum Computation, Entropy and information – Shannon Entropy, Basic
properties of Entropy, Von Neumann, Strong Sub Additivity, Data Compression, Entanglement as a
physical resource.

TOTAL:  45 PERIODS

TEXT BOOK
3. Computing since Democritus by Scott Aaronson
4. Computer Science: An Introduction by N. David Mermin
5. Yanofsky's and Mannucci, Quantum Computing for Computer Scientists.
EMBEDDED SYSTEMS

NCS-087

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**Unit-I**
Introduction to embedded systems: Classification, Characteristics and requirements, Applications

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

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

**Unit-IV**
Embedded Control and Control Hierarchy, Communication strategies for embedded systems: Encoding and Flow control.

**Unit-V**
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
SEMANTIC WEB AND WEB SERVICES

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UNIT I  12

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:-