**Dr. A. P. J. Abdul Kalam Technical University, Uttar Pradesh, Lucknow**  
(Formally Uttar Pradesh Technical University)  
**STUDY EVALUATION SCHEME**  
**B. TECH. COMPUTER SCIENCE & ENGINEERING**  
(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>
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<th>Credit</th>
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<td>General Proficiency</td>
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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.*
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<tr>
<th>SNo</th>
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**Practical’s / Training/Projects**

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</table>

* 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-074 Neural Network
3. NEOE-075 Computer Vision

Open Elective III

1. NEOE-080 Internet of Things
2. NEOE-081 Cloud Computing
3. NEOE-082 Virtual Reality

Departmental Elective III

1. NECS-071 High Speed Network
2. NECS-072 Android Operating System
3. NECS-073 Service Oriented Architecture
4. NEIT-701 Cryptographic & Network Security

Departmental Elective IV

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

Departmental Elective V

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

NEOE-070

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

NEOE-071

Unit-I

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

Unit-II

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

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

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

NEOE-072

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
SOFTWARE TESTING AND AUDIT

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, Cyclomatic Complexity, 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

NECS-074

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

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
# COMPUTER VISION

**NEOE-075**

<table>
<thead>
<tr>
<th>UNIT</th>
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<td>UNIT 1</td>
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<td>IMAGE FORMATION MODEL</td>
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<td>Monocular Imaging System, Orthographic &amp; Perspective Projection, Camera model and Camera calibration, Binocular imaging systems</td>
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</table>

| UNIT 2    | 10 |
| IMAGE PROCESSING AND FEATURE EXTRACTION | |
| Image representations (continuous and discrete), Edge detection |

| UNIT 3    | 5 |
| MOTION ESTIMATION | |
| Regularization Theory, Optical Computation, Stereo Vision, Motion Estimation, Structure from Motion. |

| UNIT 4    | 10 |
| 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    | 10 |
| 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:**

DISTRIBUTED SYSTEMS

NECS-701

Unit–I

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

Unit-II

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


Unit–IV


Unit –V

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 Elements of Distributed Computing, Wiley
5. Tenanuanbaum, Steen,” Distributed Systems”, PHI
ARTIFICIAL INTELLIGENCE

NECS-702

Unit-I

Unit-II

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

Unit-V

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,
HIGH SPEED NETWORKS

UNIT I 8

UNIT II 8

UNIT III 12

UNIT IV 8

UNIT V 8

TOTAL: 44 PERIODS

REFERENCES:
ANDROID OPERATING SYSTEM

NECS-072

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

UNIT I

UNIT II
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

UNIT IV
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
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
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 decryptionFermat’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:

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.’
INTERNET OF THINGS

NEOE-080

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Unit-I

**IoT Web Technology**


Unit-II

**IoT Applications for Value Creation**


Unit-III

**Internet of Things Privacy, Security and Governance**


Unit-IV

**Architectural Approach for IoT Empowerment**


Unit-V

**Identity Management Models in IoT**


TOTAL: 44 PERIODS

REFERENCES:

1. Olivier Hersent, David Boswarthick, Omar Elloumi “The Internet of Things key applications and protocols”, Wiley
2. Michael Miller “The Internet of Things” Pearson
3. Adrian McEwen, Hakin Cassimally “Designing the Internet of Things” Wiley India
CLOUD COMPUTING

NEOE-081

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)8
Introduction to SaaS, Web services, Web 2.0, Web OS, Case studies

Unit-V
Cloud issues and challenges8
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

REFERENCES:
1. Kailash Jayaswal, Jagannath Kallakurchi, Donald J. Houde, Dr. Deven Shah Cloud Computing Black Book Kogent Learning
2. Dr. Kumar Saurabh, Cloud Computing, Wiley
VIRTUAL REALITY

NEOE-082

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

UNIT III
OUTPUT DEVICES: 8

UNIT IV
8
Modeling and Programming: Geometric modeling, kinematics modeling, physical modeling, behaviour modeling, model management, Introduction to JAVA 3D.

UNIT V
8

TOTAL: 44 PERIODS

REFERENCES:
2. Steven M. LaValle, Virtual Reality, University of Illinois
4. Tony Parisi, Learning Virtual Reality, O'Reilly Media
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**
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**
Introduction, Geometric Transformation – Plane to Plane transformation, Mapping, Stereo Imaging – Algorithms to Establish Correspondence, Algorithms to Recover Depth

**Segmentation**

**TOTAL: 45 PERIODS**

**REFERENCES:**
Unit-I
Introduction: 8

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

Unit - V
Unsupervised Learning & Clustering: 8

TOTAL: 44 PERIODS

REFERENCES:
HIGH PERFORMANCE COMPUTING

NECS-081 L T P 10
3 0 0

UNIT I 10

UNIT II 10

UNIT III 10

UNIT IV 10

UNIT V5

TOTAL: 45 PERIODS

REFERENCES:

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

UNIT-I:
Introduction

UNIT-II:
Real Time Scheduling

UNIT-III:
Resources Sharing

UNIT-IV:
Real Time Communication
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
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,SeppoJ.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

NECS-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, Geoffrey C. Fox, Anthony J.G Hey—Grid Computing making the global infrastructure a Reality, Wiley
DATA COMPRESSIION

NECS-085

L T P
3 0 0

Unit - I: 10

Unit – II: 10

Unit-III: 10

Unit – IV: 10
Distortion criteria, Models, Scalar Ouantization: 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

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

**NECS-086**

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| UNIT II | QUANTUM COMPUTATION | 10 |   |   |

| UNIT III | QUANTUM COMPUTERS | 10 |   |   |

| 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 |   |   |

**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

NECS-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
UNIT I

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

UNIT III
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
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
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:-
The following programs should be developed in ‘C’ language preferably on ‘UNIX’ platform. The graphical development environment can be created using some appropriate library like ‘OpenGL’:

1. Implement the spatial image enhancement functions on a bitmap image –
   a. Mirroring (Inversion) (b) Rotation (Clockwise) (c) Enlargement (Double Size)
2. Implement (a) Low Pass Filter (b) High Pass Filter
3. Implement (a) Arithmetic Mean Filter (b) Geometric Mean Filter
4. Implement Smoothing and Sharpening of an eight bit color image
5. Implement (a) Boundary Extraction Algorithm (b) Graham's Scan Algorithm
6. Implement (a) Edge Detection (b) Line Detection