MALLA REDDY(MR)

Deemed to be University

MALLA REDDY (MR)
(DEEMED TO BE UNIVERSITY)

School of Computer Science and Engineering

Ph.D. Course Work

Effective from 2025-26

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School of Computer Science and Engineering

Ph.D. Course work Subjects		
S. No.	**School of Computer Science and Engineering**	**Subject Code**
1	Advanced Computer Networks	25PH05T01
2	Soft Computing Techniques	25PH05T02
3	Large Language Models (LLMs)	25PH05T03
4	Software Metrics	25PH05T04
5	Wireless Ad-Hoc and Sensor Networks	25PH05T05
6	Neural Networks for Computer Vision and Natural Language Processing	25PH05T06
7	Block chain and its Applications	25PH05T07
8	Business Intelligence & Analytics	25PH05T08
9	Machine Learning Techniques	25PH05T09
10	Digital Image Processing	25PH05T10
11	Applied Cryptography	25PH05T11
12	Advanced Computer Architecture	25PH05T12

Common Course	Research Methodology and Publication Ethics	25PH00T01

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Code:25PH05T01	ADVANCED COMPUTER NETWORKS
Credits:6	

MODULE–I
Introduction

Requirements, Network architecture, Networking principles, Network services and Layered architecture, Network services and Layered architecture, Future networks (Internet, ATM, Cable TV, Wireless – Bluetooth, Wi-Fi, WiMax, Cell phone).

MODULE–II

Virtual circuits

Fixed size packets, Small size packets, Integrated service, History, Challenges, ATM Network protocols, IP over ATM, Wireless networks: Wireless communication basics, architecture, mobility management, wireless network protocols. Ad-hoc networks Basic concepts, routing; Bluetooth (802.15.1), Wi-Fi (802.11), WiMAX (802.16), Optical Network: links, WDM system, Optical LANs, Optical paths and networks.

MODULE–III

Control of networks

Objectives and methods of control, Circuit switched networks, ATM networks. Mathematical background for control of networks like Circuit switched networks, Datagram and ATM networks.

MODULE–IV

Routing architecture

Routing between peers (BGP) , IP switching and Multi-Protocol Label Switching (MPLS), MPLS Architecture and related protocols, Traffic Engineering (TE) and TE with MPLS, NAT and Virtual Private Networks (L2, L3, and Hybrid), CIDR – Introduction, CIDR addressing, CIDR address blocks and Bit masks.

MODULE–V
Mobile IP

Characteristics, Mobile IP operation, Security related issues. Mobility in networks, Voice and Video over IP (RTP, RSVP, QoS) IPv6: Why IPv6, basic protocol, extensions and options, support for QoS, security, etc., neighbour discovery, auto- configuration, routing. Application Programming Interface for IPv6.

Text Books:

1. Tanenenbaum, “Computer Network”, PHI.

Reference Books:

1 Srinivasan Keshav” An Engineering Approach To Computer Networking“, Pearson
2 D.Bertsekas, R Gallagar, ”Data Networks and Internets” PHI.

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Code:25PH05T02	SOFT COMPUTING TECHNIQUES
Credits:6	

MODULEI

Introduction to Soft Computing Overview of soft computing, Definition, importance, and characteristics, Difference between soft computing and hard computing, Advantages of soft computing in handling uncertainty, imprecision, and complexity

Fuzzy Logic (FL) Introduction to fuzzy sets and membership functions, Fuzzy inference systems: Mamdani and Sugeno models, Applications of fuzzy logic in decision-making and control systems.

MODULEII

Artificial Neural Networks (ANNs) Basics of neural networks: Perceptrons and activation functions, Training neural networks using back propagation, Exploring architectures: Feed forward, convolutional , and recurrent neural networks, Applications of ANNs in pattern recognition and prediction

Genetic Algorithms (GAs) Fundamentals of genetic algorithms: Selection, crossover, and mutation, Optimization techniques inspired by biological evolution, Solving complex optimization problems using Gas, Applications in engineering, scheduling, and machine learning

MODULEIII

Hybrid Systems Concept of hybrid systems: Combining FL, ANNs, and Gas, Synergies between techniques to solve complex problems, Real-world examples of hybrid systems in adaptive control and decision-making,

Applications of Soft Computing Case studies in pattern recognition, data mining, and control systems, Applications in robotics, healthcare, and financial fore casting, Benefits of soft computing in solving real-world challenges.

MODULEIV

Applications of Soft Computing Case studies in pattern recognition, data mining, and control systems, Applications in robotics, healthcare, and financial forecasting, Benefits of soft computing in solving real-world challenges.

MODULEV

Advanced Soft Computing Techniques Evolutionary computation: Particle swarm optimization and ant colony optimization, Introduction to swarm intelligence and its applications, Advanced optimization techniques for high-dimensional and dynamic problems.

TEXTBOOKS

1. Introduction to Artificial Neural Systems-Jacek.M.Zurada,JaicoPublishingHouse, 1999.

2. Neural Networks and Fuzzy Systems- Kosko, B., Prentice-Hallof India Pvt. Ltd., 1994.

REFERENCEBOOKS:

1. Fuzzy Sets, Uncertainty and Information-Klir G.J.&FolgerT.A.,Prentice-HallofIndia Pvt. Ltd., 1993.

2. Fuzzy Set Theory and Its Applications-Zimmerman H.J. Kluwer Academic Publishers,1994. Introduction to Fuzzy Control-Driankov,Hellendroon,Narosa Publishers.

3. Artificial Neural Networks-Dr.B.Yagananarayana,1999,PHI,NewDelhi.

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Code:25PH05T03	Large Language Models(LLMs)
Credits:6	

MODULE–I:
Introduction to NLP (NLP Pipeline, Applications of NLP): Introduction to Statistical Language Models, Statistical Language Models: Advanced Smoothing and Evaluation, Introduction to Deep Learning (Perceptron, ANN, Back propagation, CNN Introduction to PyTorch, Word Representation, Word2Vec,fastText,GloVe,TokenizationStrategies,Neural Language Models, CNN, RNN, LSTM, GRU

MODULE–II:
Sequence-to-Sequence Models: Greedy Decoding, Beam search, Other Decoding Strategies: Nucleus Sampling, Temperature Sampling, Top-k Sampling, Attention in Sequence-to- Sequence Models. Introduction to Transformers, Self and Multi-Head Attention, Positional Encoding and Layer Normalization, Implementation of Transformers using PyTorch, Pre- Training Strategies: ELMo, BERT (Encoder-only Model), Pre-Training Strategies: Encoder- decoder and Decoder-only Models, Introduction to Hugging Face

MODULE–III:
Instruction Tuning: Prompt-based Learning, Advanced Prompting Techniques and Prompt Sensitivity, Alignment of Language Models with Human Feedback (RLHF).

MODULE–IV:
Knowledge graphs(KGs): Representation, completion, Tasks: Alignment and isomorphism, Distinction between graph neural networks and neural KG inference -Parameter-efficient Adaptation (Prompt Tuning, Prefix Tuning, LoRA) , An Alternate Formulation of **Transformers:** Residual Stream Perspective, Interpretability Techniques

MODULE–V:
Overview of recently popular models: such as GPT-4, Llama-3, Claude-3,Mistral, and Gemini, Ethical NLP – Bias and Toxicity

Text Books and references

1. Tanmoy Chakraborty, Introduction to Large Language Models, Wiley India, 1st Edition, 2025. ISBN: 9789363864740
2. Dan Jurafsky and James H. Martin, Speech and Language Processing, 2nd edition, Pearson Press,2008.
3. Jacob Eisenstein, Natural Language Processing, First edition, The MIT Press,2019.

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Code:25PH05T04	SOFWARE METRICS
Credits:6	

Module I
Foundations of Software Measurement
Measurement Theory: Representational theory, measurement scales (nominal, ordinal, interval, ratio), and valid/reliable measurement. **Goal-Based Frameworks:** Goal-Question-Metric (GQM) approach, Goal-Question-Indicator-Metric (GQIM) approach. **Classification of Metrics:** Product, process, and resource metrics.

Module II
Empirical Investigation Principles
Empirical Research in Software Engineering: Planning, conducting, and analyzing formal experiments, case studies, and quasi-experiments. **Data Collection:** Defining "good data," data collection tools, and data storage.

Statistical Analysis: Descriptive statistics, hypothesis testing, correlation, and regression analysis.

Module III
Product Metrics
Size Metrics: Lines of code (LOC), Function Points (FP), Feature Points, and object-oriented size metrics. **Structure & Complexity Metrics:** Cyclomatic complexity, coupling and cohesion metrics, Halstead's software science.

Object-Oriented (OO) Metrics: Chidamber & Kemerer (C&K) suite, inheritance and polymorphism metrics. **Quality Metrics:** Maintainability index, usability, and portability metrics.

Module IV
Process and Project Metrics
Process Metrics: Productivity, defect removal efficiency, and process maturity (CMMI). **Project Metrics:** Cost estimation (COCOMO II), effort prediction, schedule, and quality modeling. **Software Reliability:** Reliability models, failure intensity, and availability models.

Module V
Advanced Topics in Software Metrics
Bayesian Networks for Prediction: Applying Bayesian networks to software defect prediction and risk assessment. **Metrics for Agile and DevOps:** Metrics in iterative development environments. **Open Source Software Metrics:** Analyzing quality in collaborative development. **Research Paper Review:** Critical analysis of recent advancements in software measurement.

Text books
1. Fenton, N., & Bieman, J. (2014). *Software Metrics: A Rigorous and Practical Approach* (3rd ed.). CRC Press.

2. Kan, S. H. (2002). *Metrics and Models in Software Quality Engineering* (2nd ed.). Pearson Education.

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Code:25PH05T05	WIRELESS AD-HOC AND SENSOR NETWORKS
Credits:6	

MODULE–I
MAC&TCP IN ADHOC NETWORKS

Fundamentals of WLANs, IEEE 802.11 Architecture, Self-configuration and Auto configuration, Issues in Ad-Hoc Wireless Networks, MAC Protocols for Ad-Hoc Wireless Networks, Contention Based Protocols-TCP over Ad-Hoc networks, TCP protocol overview-TCP and MANETs, solutions for TCP over Ad-Hoc Networks.

MODULE–II
ROUTING IN ADHOC NETWORKS

Routing in Ad-Hoc Networks, Introduction, Topology based versus Position based Approaches, Proactive, Reactive, Hybrid Routing Approach, Principles and issues ,Location services ,DREAM ,Quorums based location service, Grid–Forwarding strategies, Greedy packet forwarding ,Restricted directional flooding, Hierarchical Routing, Issues and Challenges in providing QoS.

MODULE–III
MAC, ROUTING & QOS IN WIRELESS SENSOR NETWORKS

Introduction, Architecture, Single node architecture, Sensor network design considerations, Energy Efficient Design principles for WSNs, Protocols for WSN

Physical Layer : Transceiver Design considerations, MAC Layer Protocols, IEEE802.15.4 Zigbee, Link Layer and Error Control issues-Routing Protocols, Mobile Nodes and Mobile Robots, Data Centric& Contention Based Networking ,Transport Protocols& QOS, Congestion Control issues, Application Layer support.

MODULE–IV
SENSOR MANAGEMENT

Sensor Management, Topology Control Protocols and Sensing Mode Selection Protocols, Time synchronization, Localization and positioning, Operating systems and Sensor Network programming, Sensor Network Simulators.

MODULE–V
SECURITY IN ADHOC AND SENSOR NETWORKS

Security in Ad-Hoc and Sensor networks, Key Distribution and Management, Software based Anti-tamper techniques, water marking techniques, Defence against routing attacks, Secure Adhoc routing protocols, Broadcast authentication WSN protocols, TESLA, Biba, Sensor Network Security Protocols, SPINS.

Text Books:

1. Adrian Perrig, J.D.Tygar, "Secure Broadcast Communication: In Wired and Wireless Networks", Springer, 2006.
2. Carlos De Morais Cordeiro, Dharma Prakash Agrawal “AdHoc and Sensor Networks: Theory and Applications" (2nd Edition), World Scientific Publishing, 2011.
3. C. Siva Ram, Murthy and B.S. Manoj, “AdHoc Wireless Networks–Architectures and Protocols”, Pearson Education,2004.
4. C.K.Toh, “AdHoc Mobile Wireless Networks”, Pearson Education, 2002.
5. Erdal Çayırcı, Chunming Rong, “Security in Wireless AdHoc and Sensor Networks”, John Wiley and Sons, 2009.

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Code:25PH05T06	Neural Networks for Computer Vision and Natural Language Processing
Credits:6	

MODULE–I:

Introduction to Machine Learning: Introduction to Learning, Machine Learning Fundamentals, Optimizing ML Models, Deep Neural Network, Neural Network – Fundamentals, Introduction to Deep Learning, Deep Model for Vision, Computer Vision through ML, Deep Learning Models.

Convolution Neural Network-CNN Architectures, Optimizing CNN, CNN with Residual Connection Sequential Modelling- Recurrent Neural Network, Neural Machine Translation.

MODULE–II:

Generative Models-Generative Modelling, Auto-regressive models, Variational Auto-Encoder, Generative Adversarial Network, Diffusion Models, Large Language Model-Transformers, Language Modelling, Generative Pre-trained Transformer.

Zero and Few Shot Learning: Zero-Shot Learning, Few Shot Learning DL model for Image Enhancement- Image Enhancement, Deep Learning Models for Image Enhancing.

MODULE–III:

DL models for Image Classifications and Object Detection- Image Classification, Object Detection, DL Models for Image Classification, Object Detection, Medical Imaging, Medical Image Analysis and Synthetic image generation.

Multimodal Analysis and Self-Supervised Learning: Deep models for multi-modal image and text modeling, Semi-supervised learning, contrastive learning, Self-supervised vision, and language modeling

MODULE–IV:

Introduction to NLP Overview, applications, challenges, Regular Expressions & Text Normalization Tokenization, case folding, stemming, lemmatization, Edit Distance Levenshtein distance, applications in NLP, N-gram Language Models Smoothing, perplexity, applications, Ambiguity, Naive Bayes, and Sentiment Classification, Ambiguity in language, Naive Bayes for text classification, sentiment analysis Vector Semantics Word embeddings, cosine similarity, Neural Networks and Neural Language Models, Feedforward networks, Word2Vec, Glove, RNN, LSTM, GRU, Recurrent architectures, handling long-term dependencies, Part-of-Speech Tagging, Definition, applications, tagsets (Penn Treebank)

MODULE–V:

HMM and Maximum Entropy Models: Probabilistic sequence models, applications, CRF (Conditional Random Fields):Overview, usage in sequence labeling, Sequence Processing with Recurrent Networks, Applications of RNNs, LSTMs in tagging and entity recognition, Formal Grammars of English, CFGs, derivations, basic structures, Treebanks as Grammars, Penn Treebank, constituency structures, Syntactic Parsing, Top-down, bottom-up parsing, Statistical Parsing and PCFG, Probabilistic CFGs, statistical approaches, Dependency Parsing, Dependency grammars, transition-based and graph-based parsing, The Representation of Sentence Meaning, Logical forms, semantic representation, challenges, Word Sense Disambiguation (WSD), Supervised and unsupervised methods, Lesk algorithm

Text Books:

1. Neural Networks and Learning Machines, 3rd edition, Simon Haykin, Pearson Prentice Hall.

   Link: https://www.dai.fmph.uniba.sk/courses/NN/haykin.neuralnetworks.3ed.2009.pdf
2. Deep Learning: ByIan Goodfellow and Yoshua Bengio and Aaron Courville, MIT Press, 2016. Link: https://www.deeplearningbook.org/
3. Jurafsky D., Martin J. H., Speech and Language Processing, Prentice Hall.
4. Manning C., Schütze H., Foundations of Statistical Natural Language Processing, MIT Press.

Reference Books:

1. Deep Learning for Computer Vision By Shanmugamani Rajalingappaa, Packt Publishing Limited
2. Deep Learning with Tensor Flow By Zaccone Giancarlo, Packt Publishing Limited

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Code:25PH05T07	BLOCKCHAIN AND ITS APPLICATIONS
Credits:6	

MODULE–I

Introduction

Blockchain: Introduction, History, centralized versus Decentralized systems, layers of blockchain, Importance of blockchain, Blockchain uses and use cases. Working of Blockchain: Blockchain foundation, Cryptography, Game Theory, Computer Science Engineering, Properties of blockchain solutions, blockchain transactions, distributed consensus mechanisms, Blockchain mechanisms, Scaling blockchain Working of Bitcoin: Money, Bitcoin, Bitcoin blockchain, bitcoin network, bitcoin scripts, Full Nodes and SVPs, Bitcoin wallets.

MODULE–II

Ethereum

Three parts of blockchain, Ether as currency and commodity, Building trustless systems, Smart contracts, Ethereum Virtual Machine, The Mist browser, Wallets as a Computing Metaphor, The Bank Teller Metaphor, Breaking with Banking History, How Encryption Leads to Trust, System Requirements, Using Parity with Geth, Anonymity in Crypto currency, Central Bank Network, Virtual Machines, EVM Applications, State Machines, Guts of the EVM, Blocks, Mining's Place in the State Transition Function, Renting Time on the EVM, Gas, Working withGas, Accounts, Transactions, and Messages, Transactions and Messages, Estimating Gas Fees for Operations, Op codes in the EVM.

MODULE–III

Hyperledger

Overview, Fabric, composer, installing hyper ledger fabric and composer, deploying, running the network, error troubleshooting. Smart Contracts and Tokens: EVM as Back End, Assets Backed by Anything, Crypto currency Is a Measure of Time, Function of Collectibles in Human Systems, PlatformsforHigh-ValueDigitalCollectibles,TokensasCategoryofSmart Contract, creating a Token, Deploying the Contract, Playing with Contracts.

MODULE–IV

Mining Ether

Why? Ether's Source, Defining Mining, Difficulty, Self-Regulation, and the Race for Profit, How Proof of Work Helps Regulate Block Time, DAG and Nonce, Faster Blocks, Stale Blocks, Difficulties, Ancestry of Blocks and Transactions, Ethereum and Bitcoin, Forking, Mining, Geth on Windows, Executing Commands in the EVM via the Geth Console, Launching Geth with Flags, Mining on the Test net, GPU Mining Rigs, Mining on a Pool with Multiple GPUs. Crypto ecnomics: Introduction, Usefulness of crypto economics, Speed of blocks, Ether Issuance scheme, Common Attack Scenarios.

MODULE–V

Blockchain Application Development

Decentralized Applications, Blockchain Application Development, interacting with the Bitcoin Blockchain, Interacting Programmatically with Ethereum—Sending Transactions, Creating a Smart Contract, Executing Smart Contract Functions, Public vs. Private Blockchains, Decentralized Application Architecture, Building an Ethereum DApp: The DApp, Setting Upa Private Ethereum Network, Creating the Smart Contract, Deploying the Smart Contract, Client Application, DApp deployment: Seven Ways to Think About Smart Contracts,DappContractDataModels,EVMback-endandfront-endcommunication,JSON- RPC, Web 3, JavaScript API, Using Meteor with the EVM, Executing Contracts in the Console, Recommendations for Prototyping, Third-Party Deployment Libraries, Creating Private Chains.

TextBook(s)

1. Mohsen Attaranand Angappa Gunasekaran,"Applications of Blockchain Technology in Business Challenges and Opportunities", Springer International Publishing, Year: 2019

2. ImranBashir,"MasteringBlockchain:DistributedLedgerTechnology,Decentralization, andSmart Contracts Explained", Second Edition, Packt Publishing, 2018.

Reference(s)

1. Mougayar W. The business blockchain: promise, practice, and application of the next Internet technology. John Wiley & Sons; 2016 May 9.

2. Narayanan A, Bonneau J, Felten E, Miller A, Goldfeder S. Bitcoinand cryptocurrency technologies: A comprehensive introduction. Princeton University Press; 2016 Jul

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Code:25PH05T08	Business Intelligence and Analytics
Credits:6	

MODULE – I

An Overview of Business Intelligence, Analytics, and Decision Support Information Systems Support for Decision Making, An Early Framework for Computerized Decision Support, The Concept of Decision Support Systems, A Framework for Business Intelligence, Business Analytics Overview, Brief Introduction to Big Data Analytics.

Module-II

Decision Making

Introduction and Definitions, Phases of the Decision, Making Process, The Intelligence Phase, Design Phase, Choice Phase, Implementation Phase, Decision Support Systems Capabilities, Decision Support Systems Classification, Decision Support Systems Components.

Module-III

Neural Networks and Sentiment Analysis

Basic Concepts of Neural Networks, Developing Neural Network-Based Systems, Illuminating the Black Box of ANN with Sensitivity, Support Vector Machines, A Process Based Approach to the Use of SVM, Nearest Neighbor Method for Prediction, Sentiment Analysis Overview, Sentiment Analysis Applications, Sentiment Analysis Process, Sentiment Analysis, Speech Analytics.

Module-IV

Model-Based Decision Making

Decision Support Systems modeling, Structure of mathematical models for decision support, Certainty, Uncertainty, and Risk, Decision modeling with spread sheets, Mathematical programming optimization, Decision Analysis with Decision Tables and Decision Trees, Multi-Criteria Decision Making With Pair wise Comparisons.

Module-V

Automated Decision Systems and Expert Systems

Automated Decision Systems, The Artificial Intelligence field, Basic concepts of Expert Systems, Applications of Expert Systems, Structure of Expert Systems, Knowledge Engineering, Development of Expert Systems.

Text Books:

1.Ramesh Sharda, Dursun Delen, Efraim Turban, J.E. Aronson, Ting-Peng Liang, David King, “Business Intelligence and Analytics: System for Decision Support”, 10th Edition, Pearson Global Edition, 2013

Referencebooks:

1.Data Analytics: The Ultimate Beginner's Guide to Data Analytics Paperback–12 November 2017 by Edward Mize.

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Code:25PH05T09	MACHINE LEARNING TECHNIQUES
Credits:6	

MODULE–I

Introduction: Defining learning systems, Goals and applications of machine learning. Aspects of developing a learning system: training data, concept representation, function approximation, supervised learning, unsupervised learning, Reinforcement learning, learning algorithms.

MODULE–II

Decision Tree Learning: Representing concepts as decision trees. Recursive induction of decision trees. Picking the best splitting attribute: entropy and information gain. Searching for simple trees and computational complexity, Over fitting, noisy data, and pruning.

MODULE–III:

Ensemble Learning: Bagging, boosting, and Ada-Boost. Experimental Evaluation of Learning Algorithms, Measuring the accuracy of learned hypotheses, Comparing learning algorithms: cross-validation, learning curves, and statistical hypothesis testing.

MODULE–IV:

Rule Learning: Translating decision trees into rules. Artificial Neural Networks: Neurons and biological motivation,. Linear threshold units.

Perceptrons: Representational limitation and gradient descent training. Multilayer networks and back propagation. Hidden layers and constructing intermediate, distributed representations, Over fitting, learning network structure, recurrent networks.

MODULE–V:

Support Vector Machines: Maximum margin linear separators. Kernels for learning non-linear functions. Bayesian Learning: theory and Bayes rule. Naive Bayes learning algorithm. Parameter smoothing. Generative vs. discriminative training. Logisitic regression. Bayes nets and Markov nets for representing dependencies. Instance-Based Learning: Constructing explicit generalizations versus comparing to past specific examples. k-Nearest-neighbor algorithm.

Text Books:

1 Machine Learning–Tom M.Mitchell,-MGH

2 Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis(CRC)

Reference Books:

1 Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge University Press.

2 Richardo.Duda,PeterE.HartandDavidG.Stork,patternclassification,JohnWiley&SonsInc., 2001

3 ChrisBishop,NeuralNetworksforPatternRecognition,OxfordUniversityPress,1995

Code:25PH05T10	DIGITAL IMAGE PROCESSING
Credits:6	

MODULE–I

Introduction

Digital image processing, Fundamental steps in digital image processing, components of imageprocessingsystem,Examplesoffieldsthatusedigitalimageprocessing,Imagesensing and Acquisition, Sampling and quantization, Basic relationships between pixels.

MODULE–II

Image enhancement in the spatial domain:

Introduction, Basic gray-level transformations, Histogram processing, Enhancement using arithmetic and logic operators, Basics of spatial filtering, smoothing and sharpening, spatial filters, Combining the spatial enhancement methods.

MODULE–III

Color Image Processing:

Introduction, Color fundamentals, Color mode, Pseudo color image processing, Basics of full color image processing, Color transformations, Color image smoothing and sharpening, Color segmentation

MODULE–IV

Image Compression:

Fundamentals, image compression models Error-free compression Lossy predictive coding.

MODULE–V

Morphological Image Processing:

Preliminaries, dilation, erosion Open and closing Hit or miss transformation Basic morphologic algorithms.

TEXTBOOKS:

1. Digital Image Processing- Rafeal C. Gonzalez, RichardE. Woods, 3rd Edition,Pearson,2008
2. Digital Image Processing-S Jayaraman, S. Essakkirajan, T.Veerakumar-TMH,2010

REFERENCE BOOKS:

1 Digital Image Processing and analysis-human and computer vision application with using CVIP Tools – Scotte Umbaugh, 2nd Ed, CRC Press,2011

2. Introduction to Digital Image Processing with Matlab, Alasdair Mc Andrew, Thomson Course Technology

3. Fundamentals of Digital Image Processing -A.K.Jain,PHI,1989

4. Digital Image Processing and computer Vision-Somka, Halavac, Boyle - Cengage learning (Indian edition)2008,

5. Digital Image Processing using Matlab, Rafeal C.Gonzalez, RichardE. Woods, Steven L. Eddins, Pearson Education.

6. Introduction to Image Processing &Analysis-John C.Russ, J.Christian Russ, CRC Press, 2010

7. Digital Image Processing with MATLAB & Lab view -Vipula Singh Elsevier

MALLA REDDY(MR)
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Code:25PH05T11	ADVANCED CRYPTOGRAPHY
Credits:6	

Module-I
OSI security architecture:
Classical encryption techniques, Cipher principles, Data encryption standard, Block cipher design principles and modes of operation, Evaluation criteria for AES, AES cipher, Triple DES, Placement of encryption function, Traffic confidentiality.

Module-II
Key management:
Diffie Hellman key exchange, Elliptic curve architecture and cryptography, Introduction to number theory, Confidentiality using symmetric encryption, Public key cryptography and RSA.

Module-III
Authentication requirements:
Authentication functions, Message authentication codes, Hash functions, Security of hash functions and MACS, MD5 Message Digest algorithm, Secure hash algorithm, Ripend, HMAC digital signatures, Authentication protocols.

Module-IV
Quantum Cryptography and Quantum Teleportation:
Heisenberg uncertainty principle, polarization states of photons, quantum cryptography using polarized photons, local vs. non local interactions, entanglements, EPR paradox, Bell's theorem, Bell basis, teleportation of a single qubit theory and experiments.

Module-V
Future trends:
Review of recent experimental achievements, study on technological feasibility of a quantum computer candidate physical systems and limitations imposed by noise.

TEXT BOOKS:

1. Kai Hwang, Advanced Computer architecture Parallelism, scalablity, Programmablity, Mc Graw Hill, N.Y,2003

2. Kai Hwangand F.A.Briggs,"Computer architecture and parallel processor" 'Mc Graw Hill, N.Y,1999

REFERENCES:

1. David A.Paerson and John L.Hennessey, —Computer organizaon and design Elsevier, Fifth edition, 2014.
2. www.sci.tamucc.edu/~sking/Courses/COSC5351/syllabus.php

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Code:25PH05T12	ADVANCED COMPUTER ARCHITECTURE
Credits:6	

Module-I
PARALLELCOMPUTERMODELS
Evolution of Computer architecture, system attributes to performance, Multi processors and multi computers, Multi-vector and SIMD computers, PRAM and VLSI models-Parallelism in Programming, conditions for Parallelism-Program Partitioning and Scheduling-program flow Mechanisms-Speed up performance laws-Amdahl‘s law, Gustafson‘s law-Memory bounded speedup Model.

Module-II
MEMORYSYSTEMSANDBUSES
Memory hierarchy-cache and shared memory concepts-Cache memory organization-cache addressing models, Aliasing problem in cache, cache memory mapping techniques-Shared memory organization-Interleaved memory organization, Lower order interleaving, Higher order interleaving. Backplane bus systems-Bus addressing, arbitration and transaction.

Module-III
ADVANCEDPROCESSORS
Instruction set architectures-CISC and RISC scalar processors-Superscalar processors-VLIW architecture- Multi vector and SIMD computers-Vector processing principles-C ray Y-MP 816 system-Inter processor communication

Module-IV
MULTI PROCESSOR AND MULTI COMPUTERS
Multi processor system interconnects - Cross bar switch, Multiport memory-Hotspot problem, Message passing mechanisms-Pipelined processors-Linear pipeline, on linear pipeline Instruction pipeline design-Arithmetic pipeline design.

Module-V
DATA FLOW COMPUTERS AND VLSI COMPUTATIONS
Data flow computer architectures-Static, Dynamic-VLSI Computing Structures-Systolic array architecture, mapping algorithms into systolic arrays, Reconfigurable processor array-VLSI matrix arithmetic processors-VLSI arithmetic models, partitioned matrix algorithms, matrix arithmetic pipelines

Textbooks

1. J.L.Hennessy, D.A.Patterson, Computer Architecture: a quantitative approach, Morgan Kaufmann, 5th edition, 2011, ISBN: 978-1558605961.
2. William Stallings, Computer Organization and Architecture, Prentice Hall, 10th edition, 2015, ISBN-10:013293633X, ISBN-13:978-0132936330

References

1. Andrew S.Tanenbaum, Structured Computer Organization, Prentice Hall, 6thedition, 2012, ISBN: 978-0132916523.
2. Patterson, J.L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Morgan Kaufmann, 5th edition,2013,ISBN-13: 9780124078864
3. C. Hamacher, Z. Vranesic and S.Zaky, Computer Organization, McGraw-Hill,5th edition, 2002, ISBN: 0072320869.